

November 2, 2017

City Council Special Meeting – Florida T



TASK I

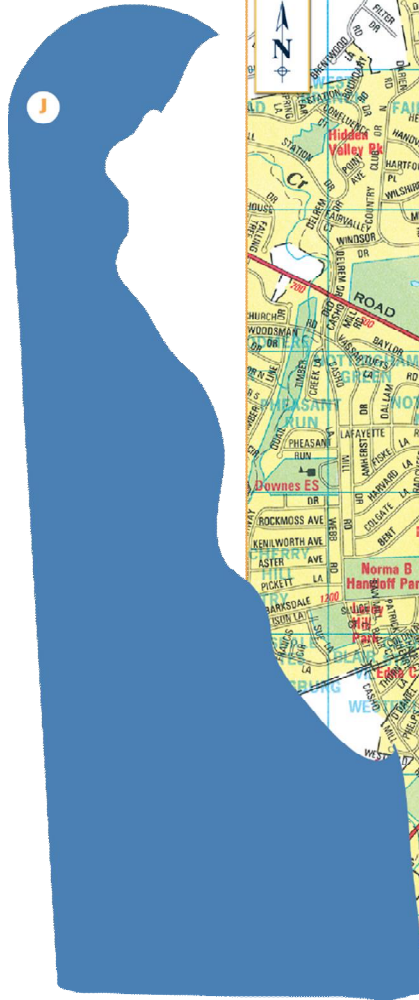
HAZARD ELIMINATION PROGRAM



Whitman, Requardt & Associates, LLP
Engineers · Architects · Environmental Planners Est. 1915

SITE J

N311 (N. College Avenue) MP 0.0 – 0.39



From W. Main St
to 0.06 mile
south of White
Clay Drive

AADT – 4,300
Length – 0.40 mi
Speed – 25 mph

SITE P N309 (Cleveland Avenue) - MP 0.2 - 1.3



From 0.07 mile east of Rose Street to SR 2/SR 72

AADT – 28,800
Length – 1.11 mi
Speed – 25/35 mph

SITE P Relevant HEP project history since 1996

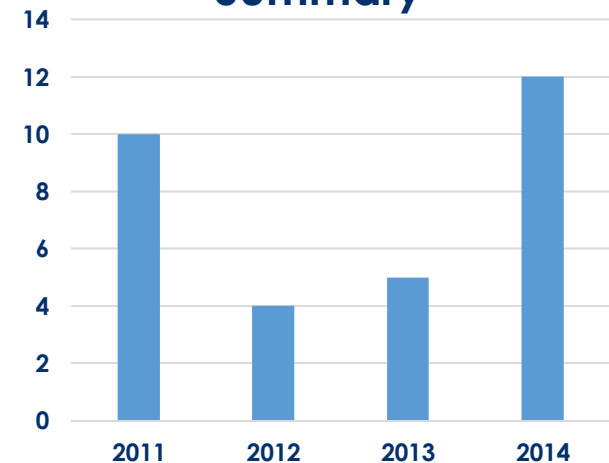
- 2003 HEP Site C
 - Possum Park Rd left-turn safety improvements
- 2005 HEP Site K
 - Cleveland Ave road diet and Florida T were considered
- 2012 HEP Site L/Z
 - Left-turn safety improvements at SR 2/SR 72 at E Cleveland Ave (May 2015)
- 2015 HEP Site J/P
 - Cleveland Ave Improvement Task Force
- 2017 HEP site selection
 - Library Ave: 4.47 critical ratio
 - Cleveland Ave: 4.31 critical ratio

SITE P

Before full intersection reconfiguration & re-phasing

- Crash summary (“before” – 1/1/11 – 5/20/15)
 - Capitol Trail at E. Cleveland Ave/Woodlawn Ave
 - 34 NB left-turn crashes
 - 18 EB rear end crashes
 - 9 EB right-turn/SB sideswipe crashes
 - 7 NB/WB angle crashes
 - 5 EB right-turn rear end crashes
 - 2 EB right-turn/WB left-turn crashes

NB Left-Turn Crash Summary



SITE P

Prior to Woodlawn Ave double left

- Crash summary (“after 1” – 5/21/15 – 10/11/16)
 - Capitol Trail at E. Cleveland Ave/Woodlawn Ave
 - **0 NB left-turn crashes**
 - 4 EB rear end crashes
 - 9 EB right-turn/SB sideswipe crashes
 - **0 NB/WB angle crashes**
 - 3 EB right-turn rear end crashes
 - 7 EB right-turn/WB left-turn crashes

SITE P

After Woodlawn Ave double left

- Crash summary (“after 2” – 10/12/16 – 10/23/17)
 - Capitol Trail at E. Cleveland Ave/Woodlawn Ave
 - **0 NB left-turn crashes**
 - 3 EB rear end crashes
 - 2 EB right-turn/SB sideswipe crash
 - **0 NB/WB angle crashes**
 - 1 EB right-turn rear end crash
 - 7 EB right-turn/WB left-turn crashes

SITE P

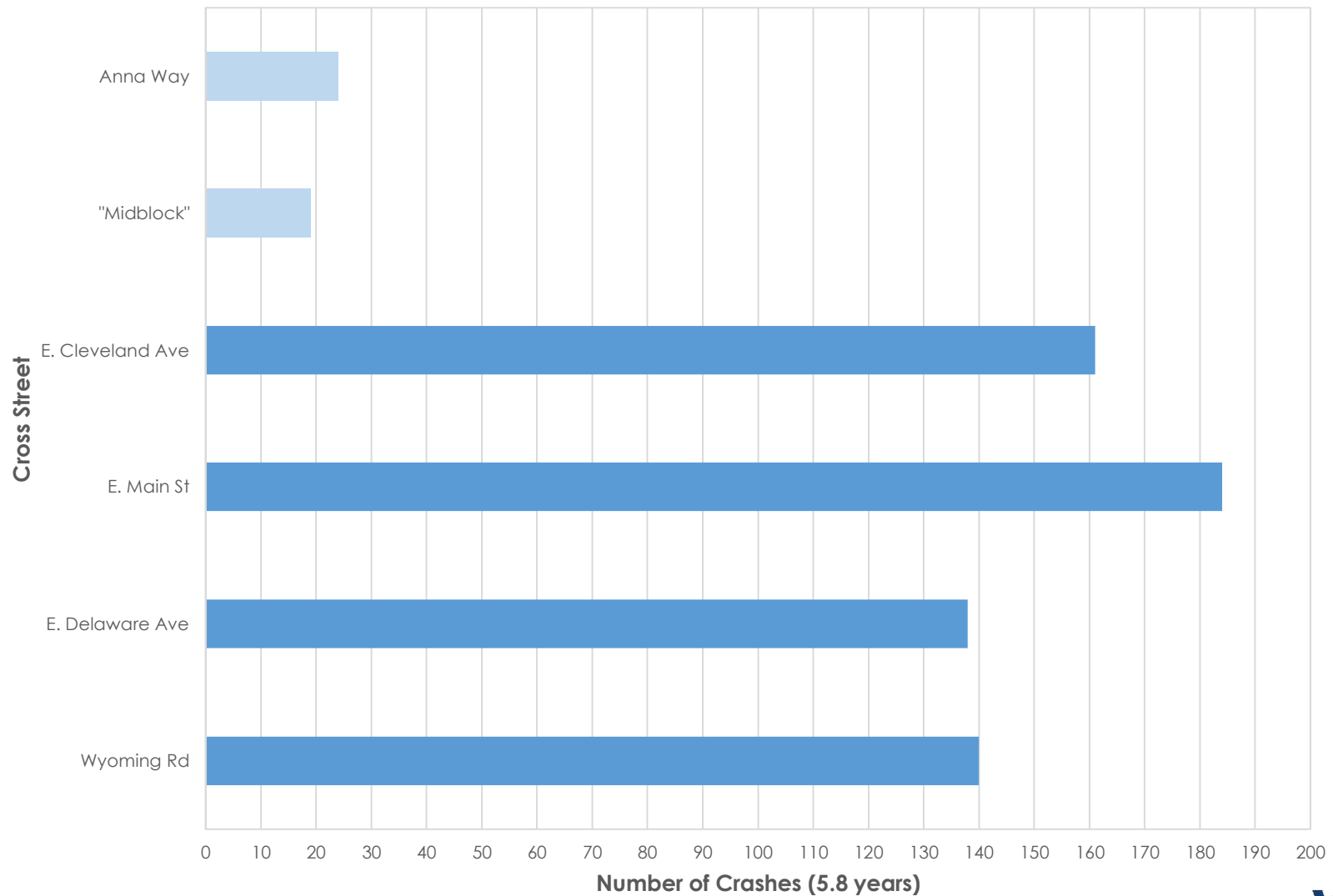
Capitol Trail – Cleveland/Woodlawn to Anna Way

- Capitol Trail – “midblock” crash summary (1/2012-10/2017)
 - 4 NB lost control crashes (3 DUI)
 - 4 NB sideswipe crashes
 - 3 SB lost control crashes (1 DUI; 1 icy)
 - 2 NB rear end crashes
 - Involved non-contact vehicles turning into driveways/side streets
 - 2 NB crashes involving deer
 - 2 SB rear end
 - 1 involved vehicle slowing to enter Capitol Plaza Professional Center
 - 1 involved vehicle slowing for police officer
 - 1 SB pedestrian crash
 - Details vague/unclear
 - 1 SB sideswipe crash

SITE P

Capitol Trail/Library Ave corridor crash data

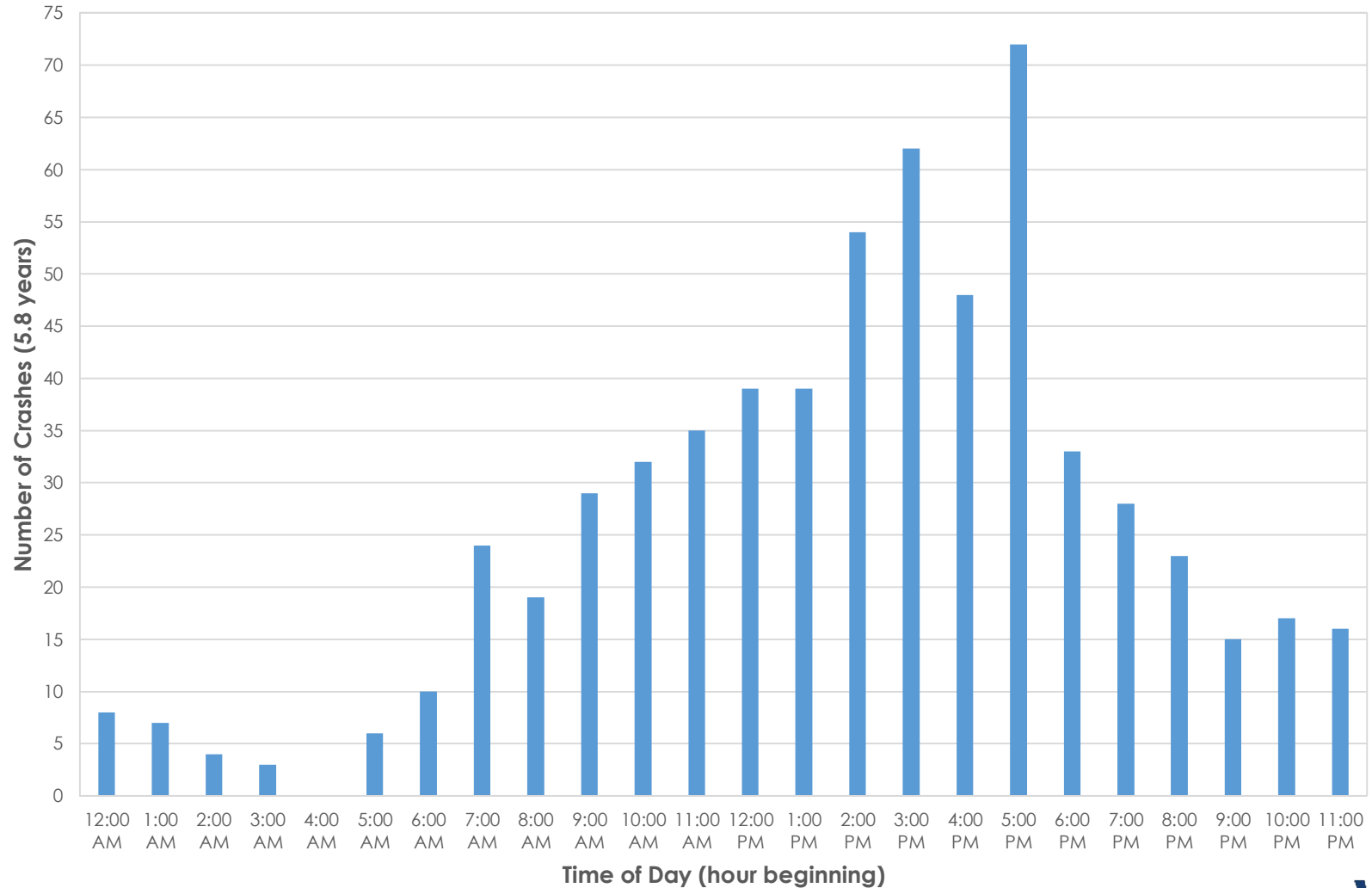
Capitol Tr / Library Ave Crash History by Intersection (Jan 2012 – Oct 2017)



SITE P

Capitol Trail/Library Ave corridor crash data

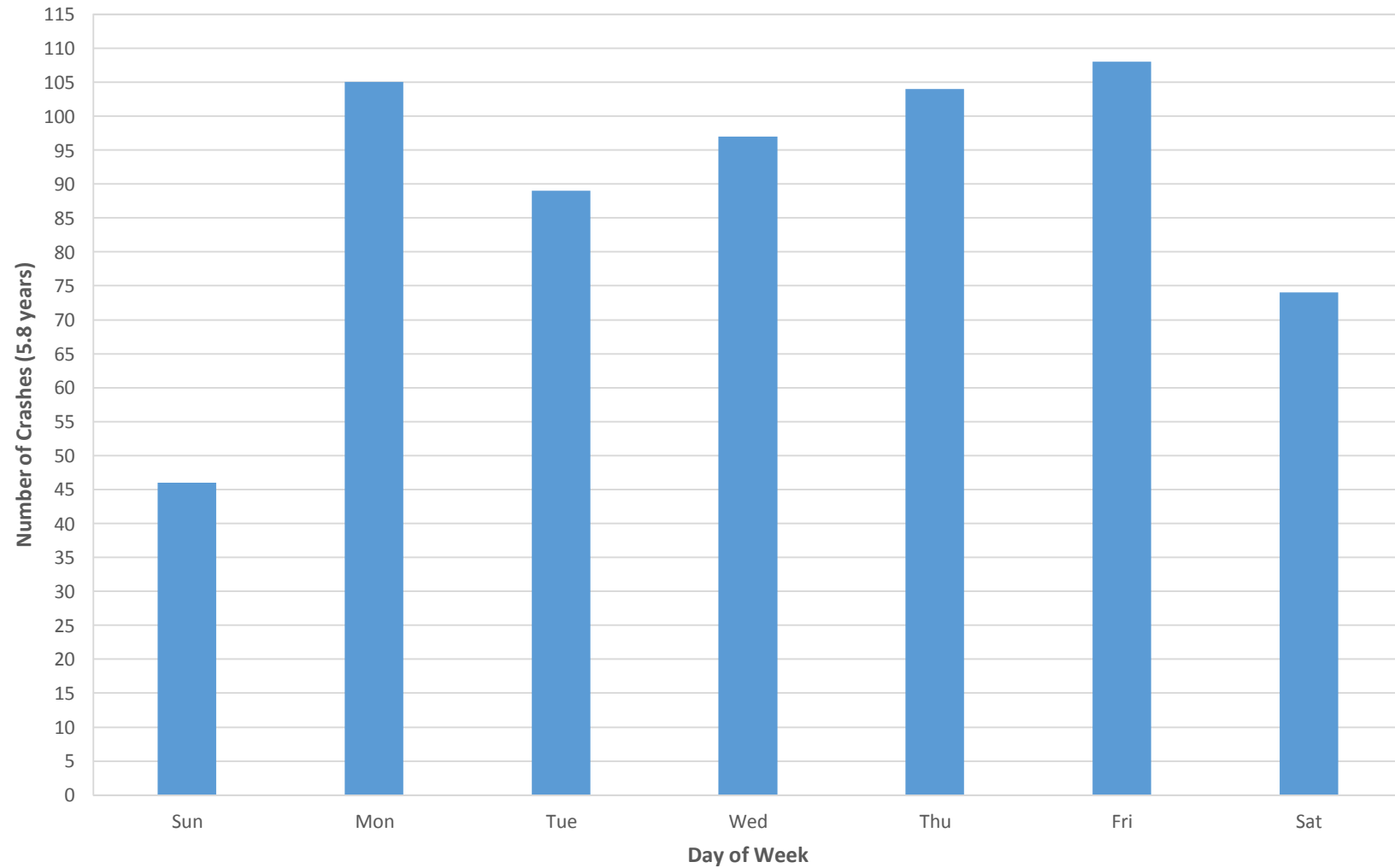
Capitol Tr / Library Ave, Wyoming Rd to E. Cleveland Ave
Crash History by Time of Day (Jan 2012 – Oct 2017)



SITE P

Capitol Trail/Library Ave corridor crash data

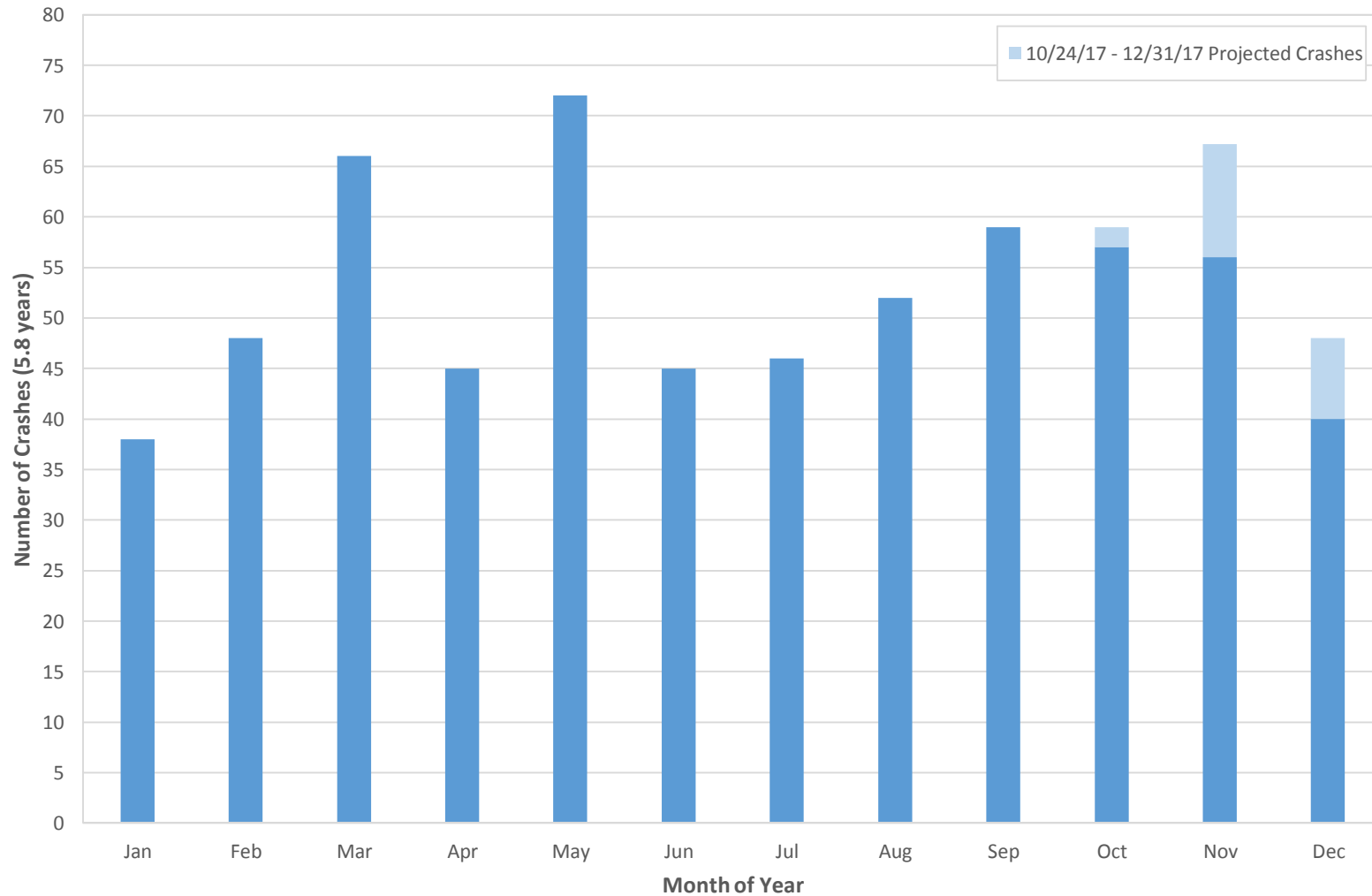
Capitol Tr / Library Ave, Wyoming Rd to E. Cleveland Ave
Crash History by Day of Week (Jan 2012 - Oct 2017)



SITE P

Capitol Trail/Library Ave corridor crash data

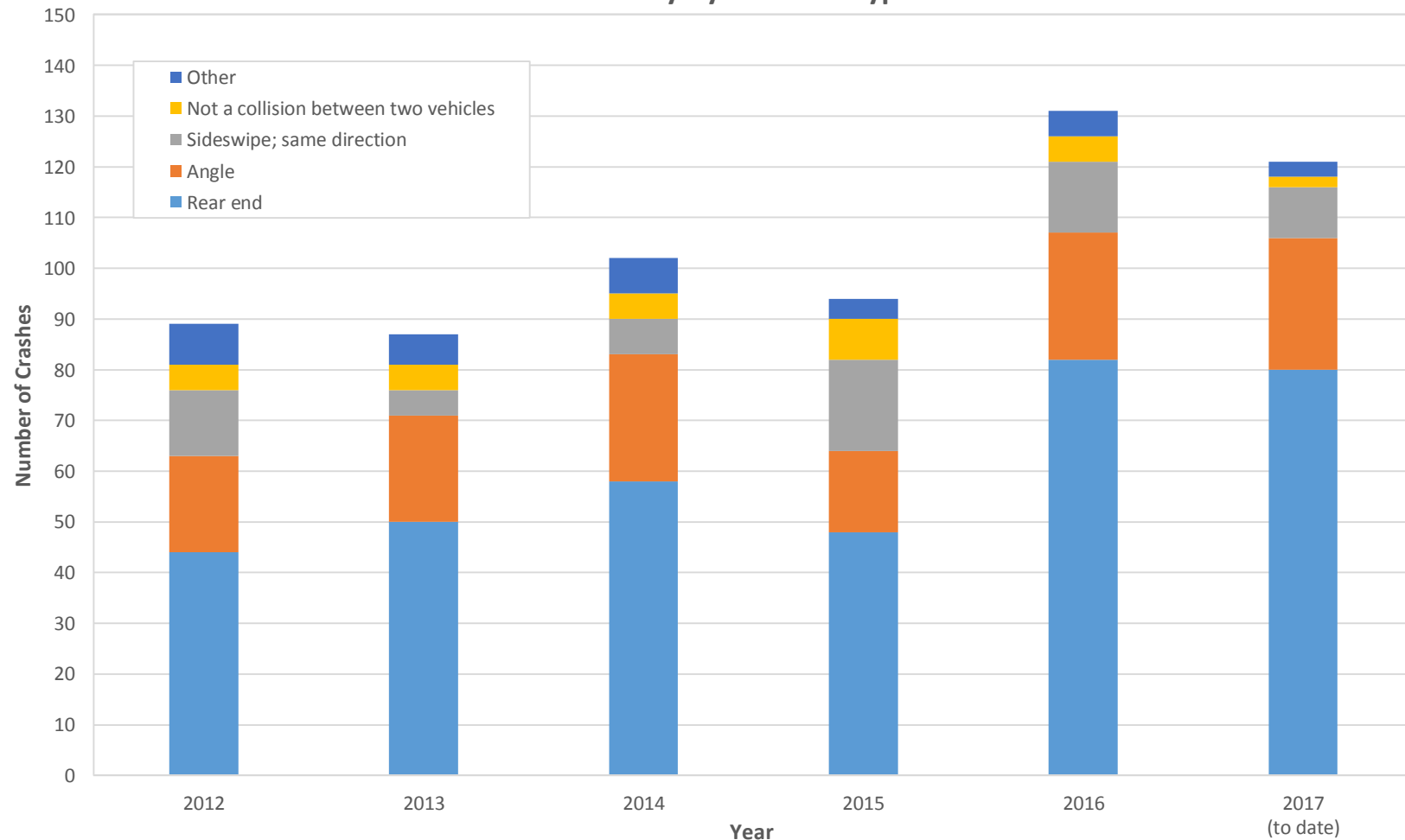
Capitol Tr / Library Ave, Wyoming Rd to E. Cleveland Ave
Crash History by Month of Year (Jan 2012 - Oct 2017)



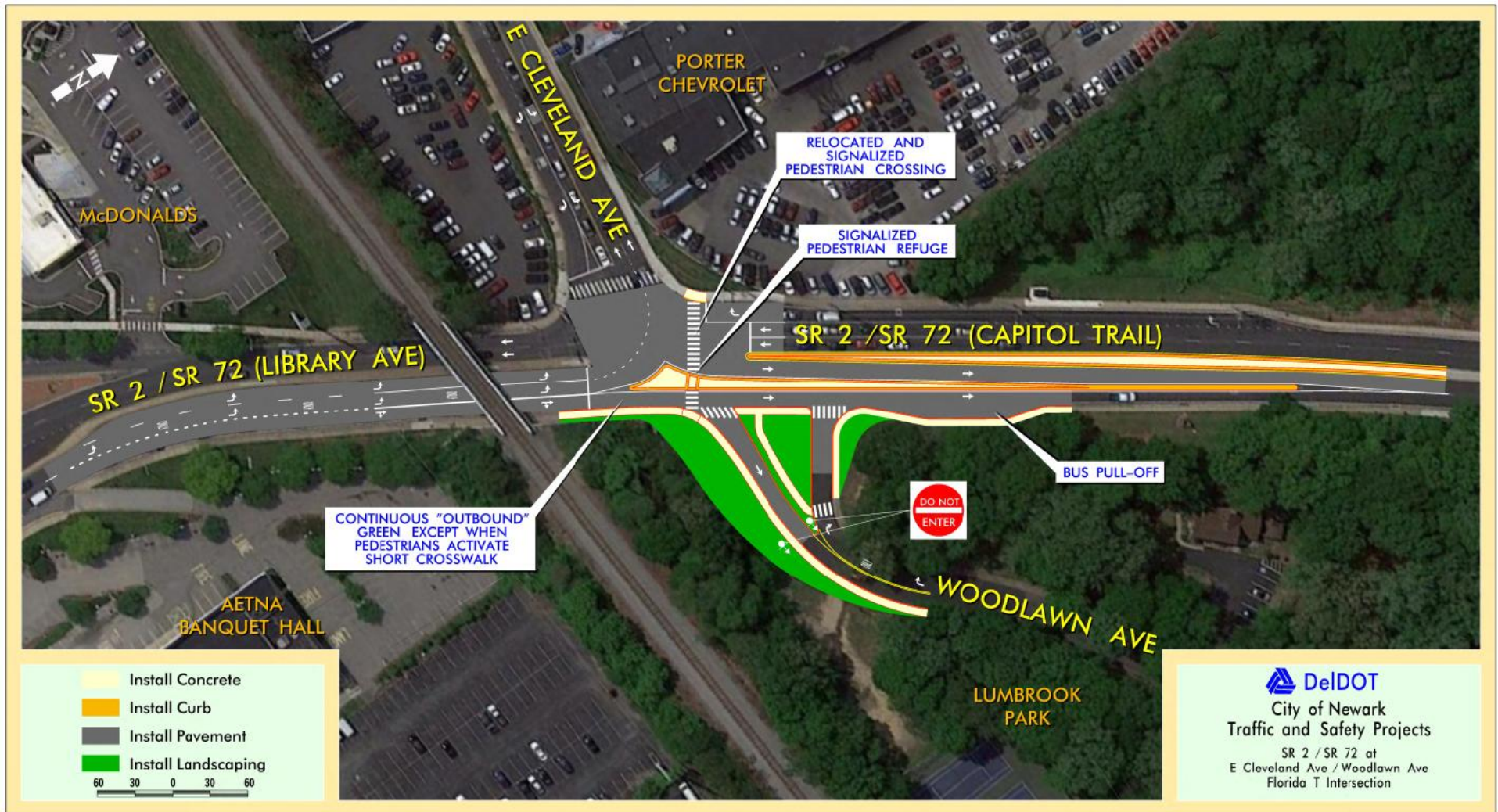
SITE P

Capitol Trail/Library Ave corridor crash data

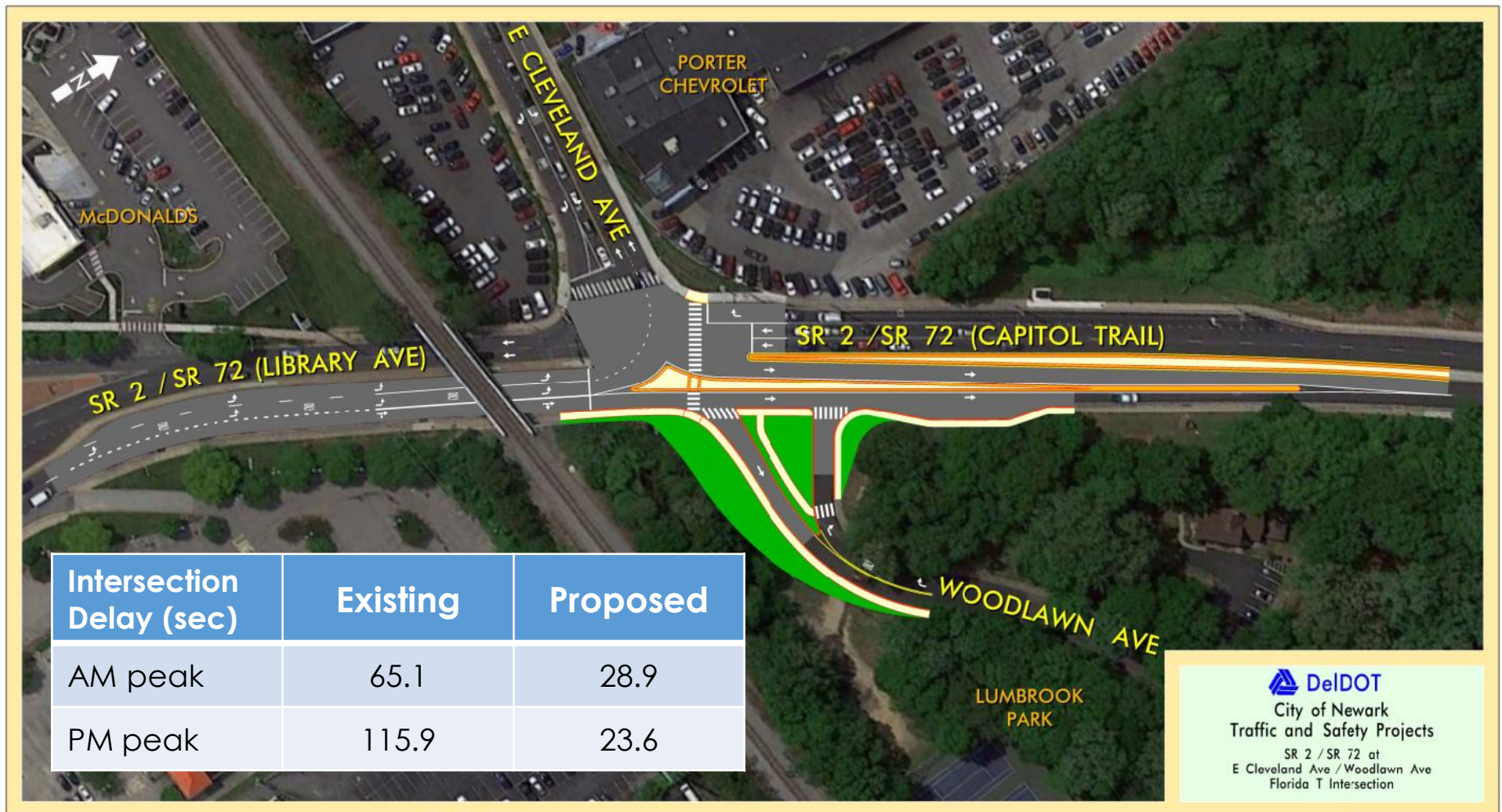
Capitol Tr / Library Ave, Wyoming Rd to E. Cleveland Ave,
Crash History by Year and Type



SITE P SR 2/SR 72/Woodlawn Ave – Florida T Concept



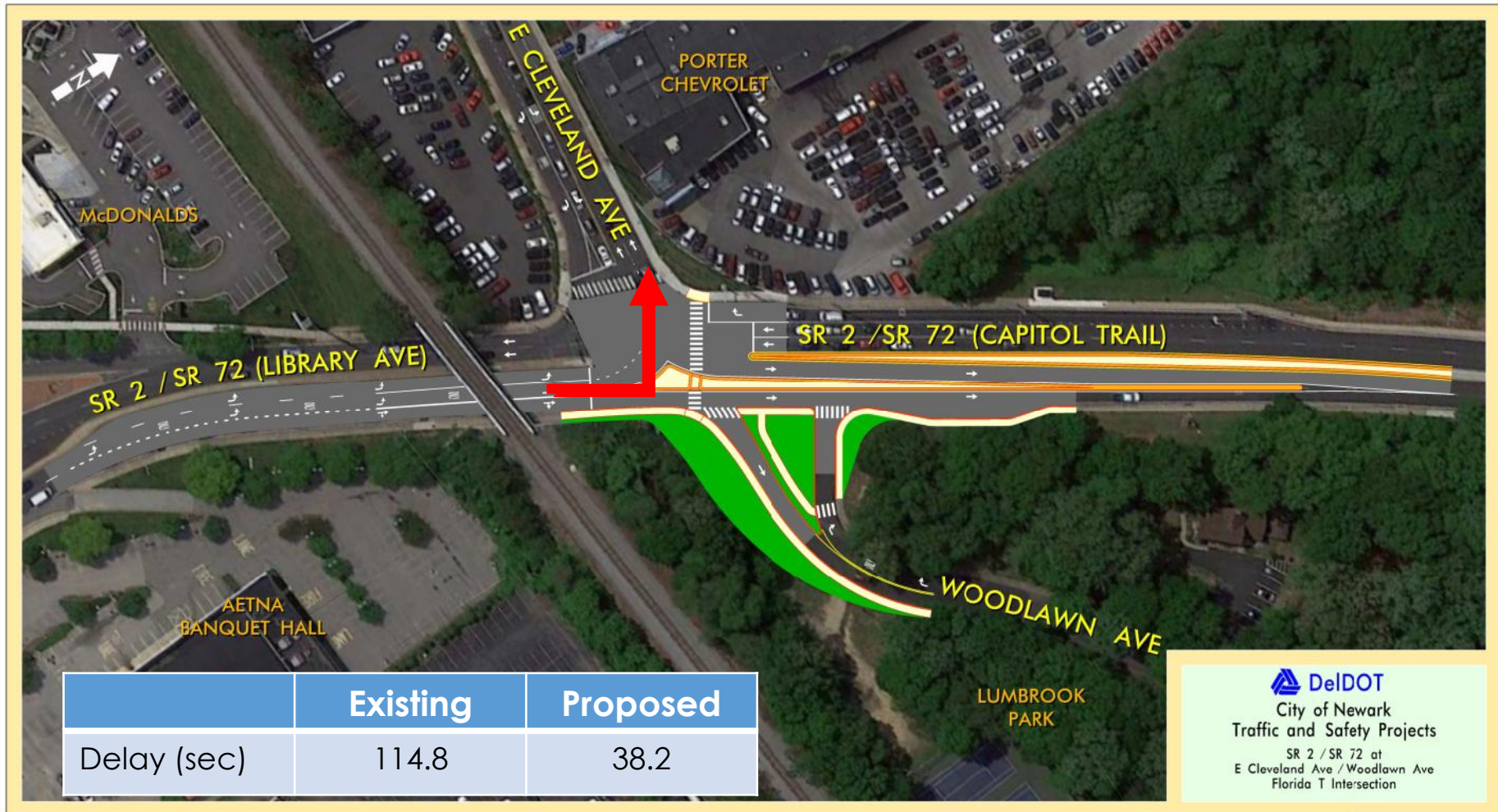
SITE P SR 2/SR 72/Woodlawn Ave – Florida T Concept



SITE P SR 2/SR 72/Woodlawn Ave – Florida T Concept

NB left – AM peak

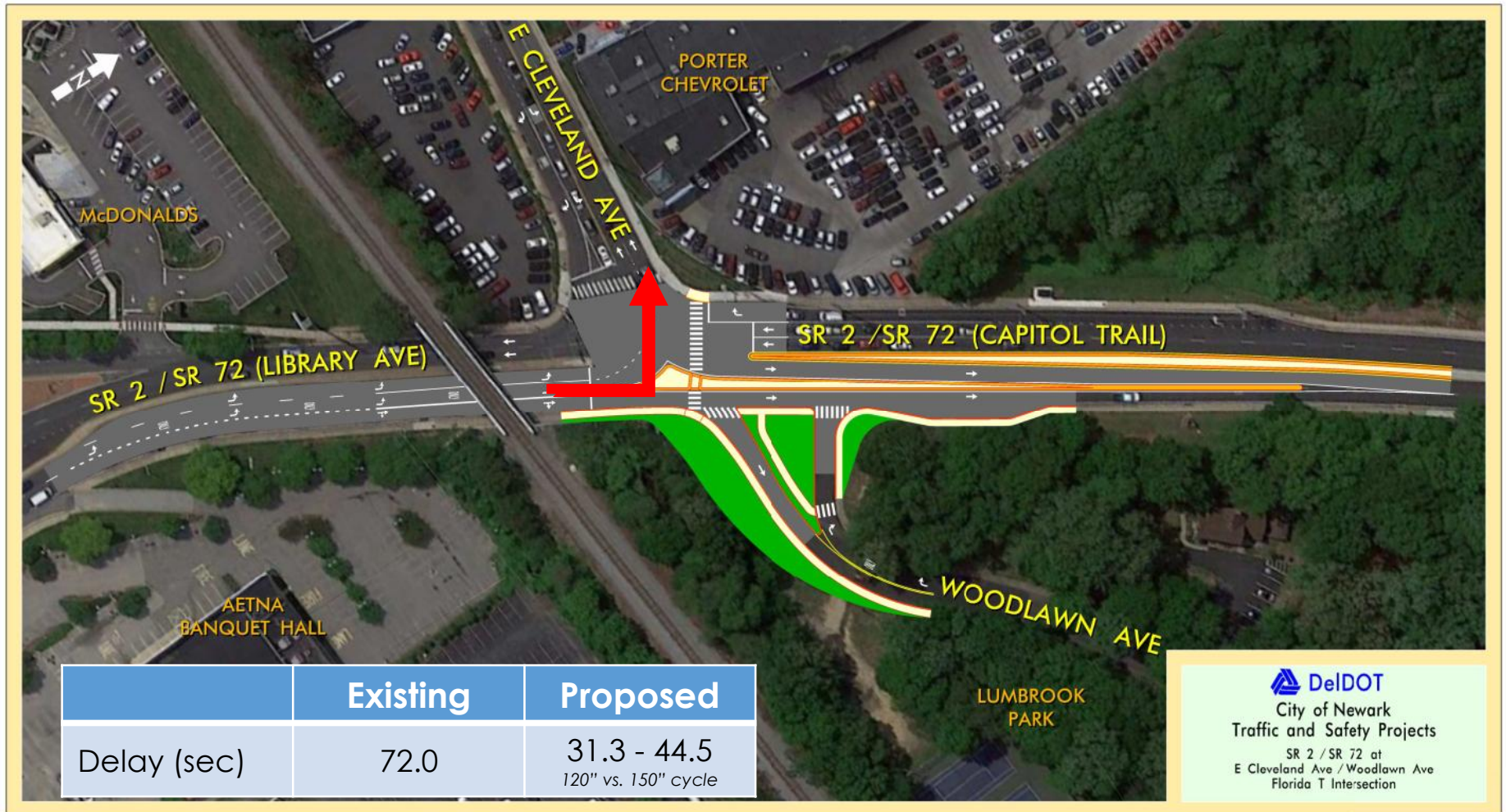
547 vehicles per hour



SITE P SR 2/SR 72/Woodlawn Ave – Florida T Concept

NB left – PM peak

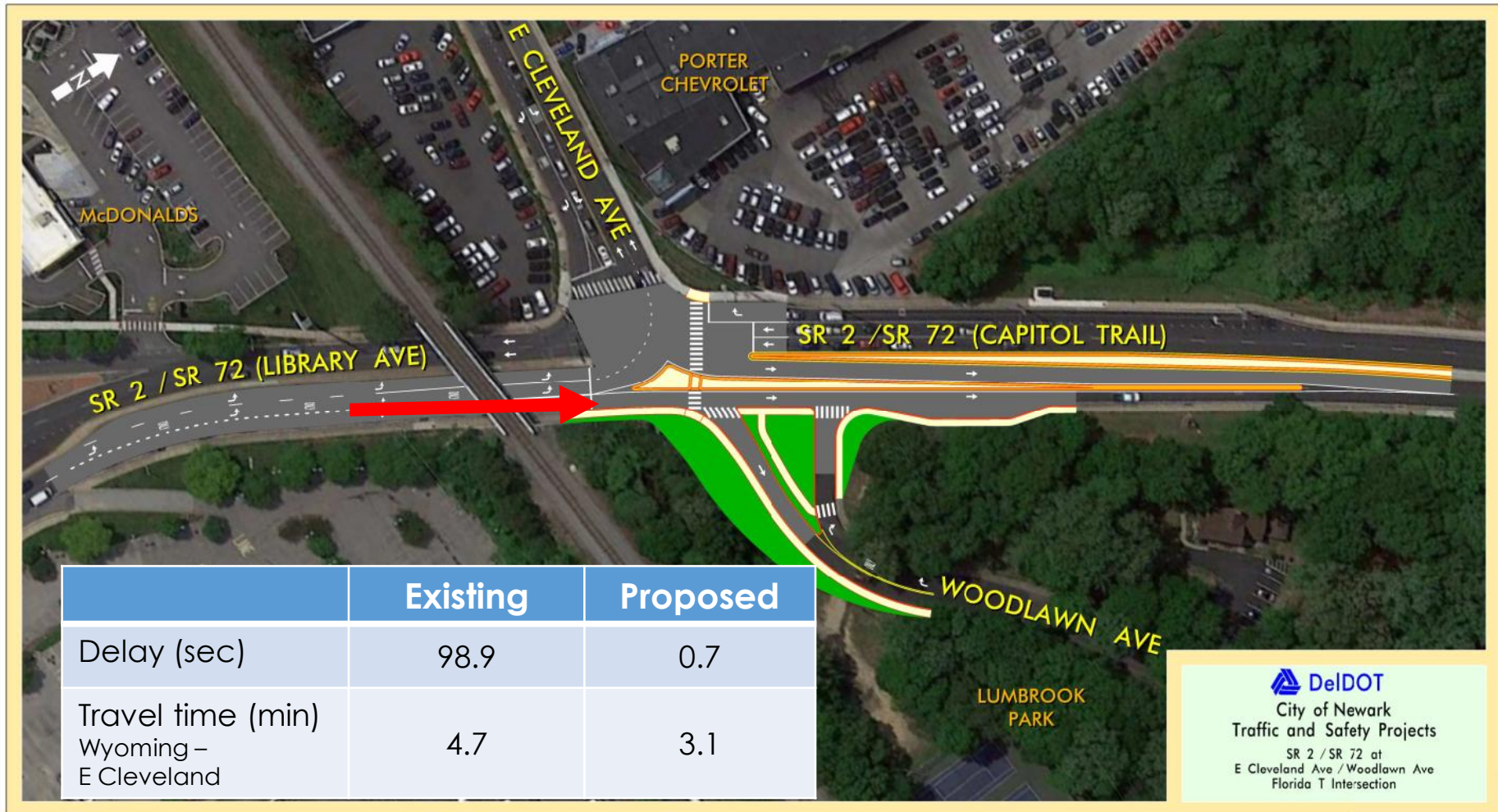
493 vehicles per hour



SITE P SR 2/SR 72/Woodlawn Ave – Florida T Concept

NB thru – AM peak

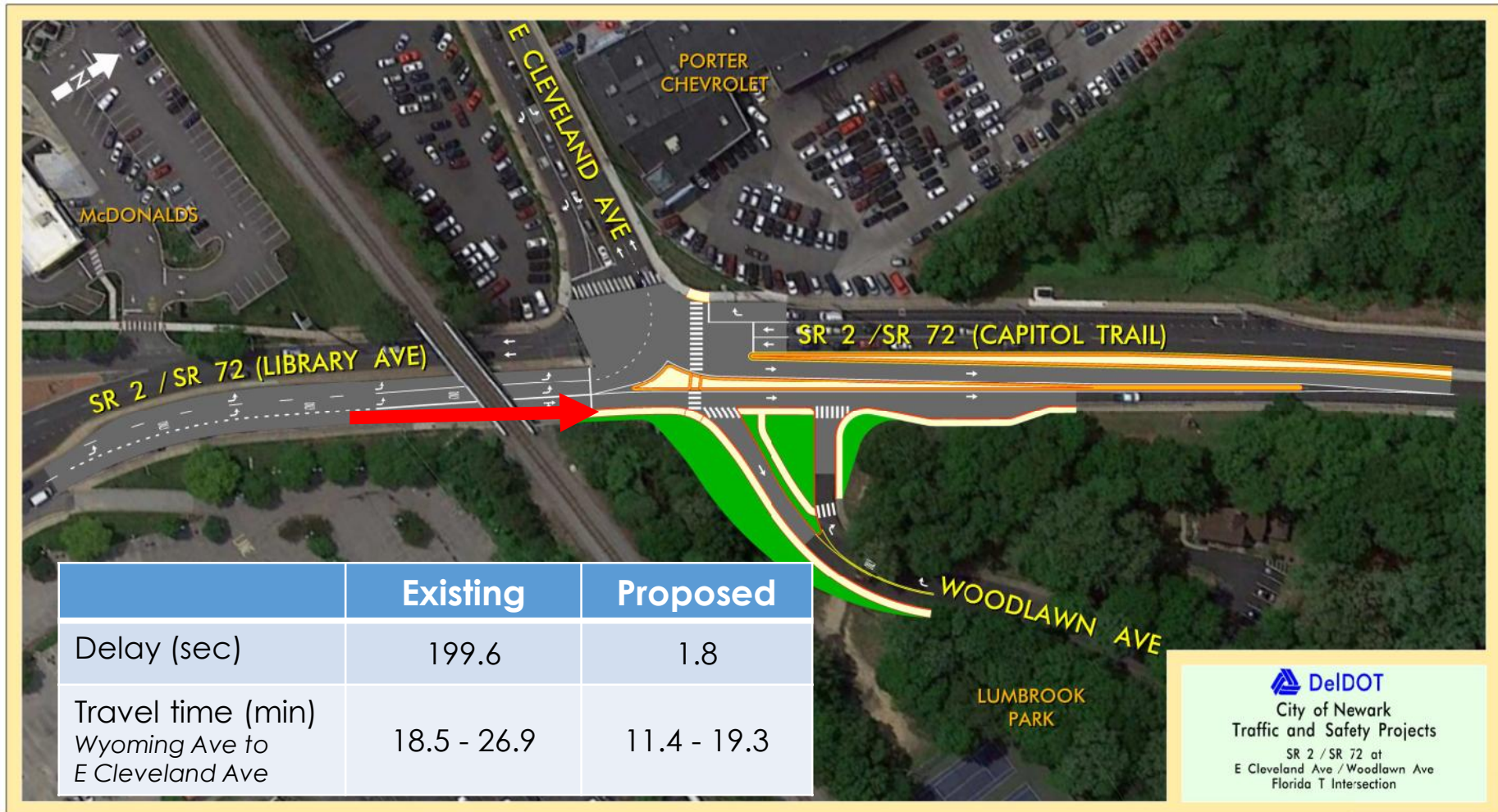
699 vehicles per hour



SITE P SR 2/SR 72/Woodlawn Ave – Florida T Concept

NB thru – PM peak

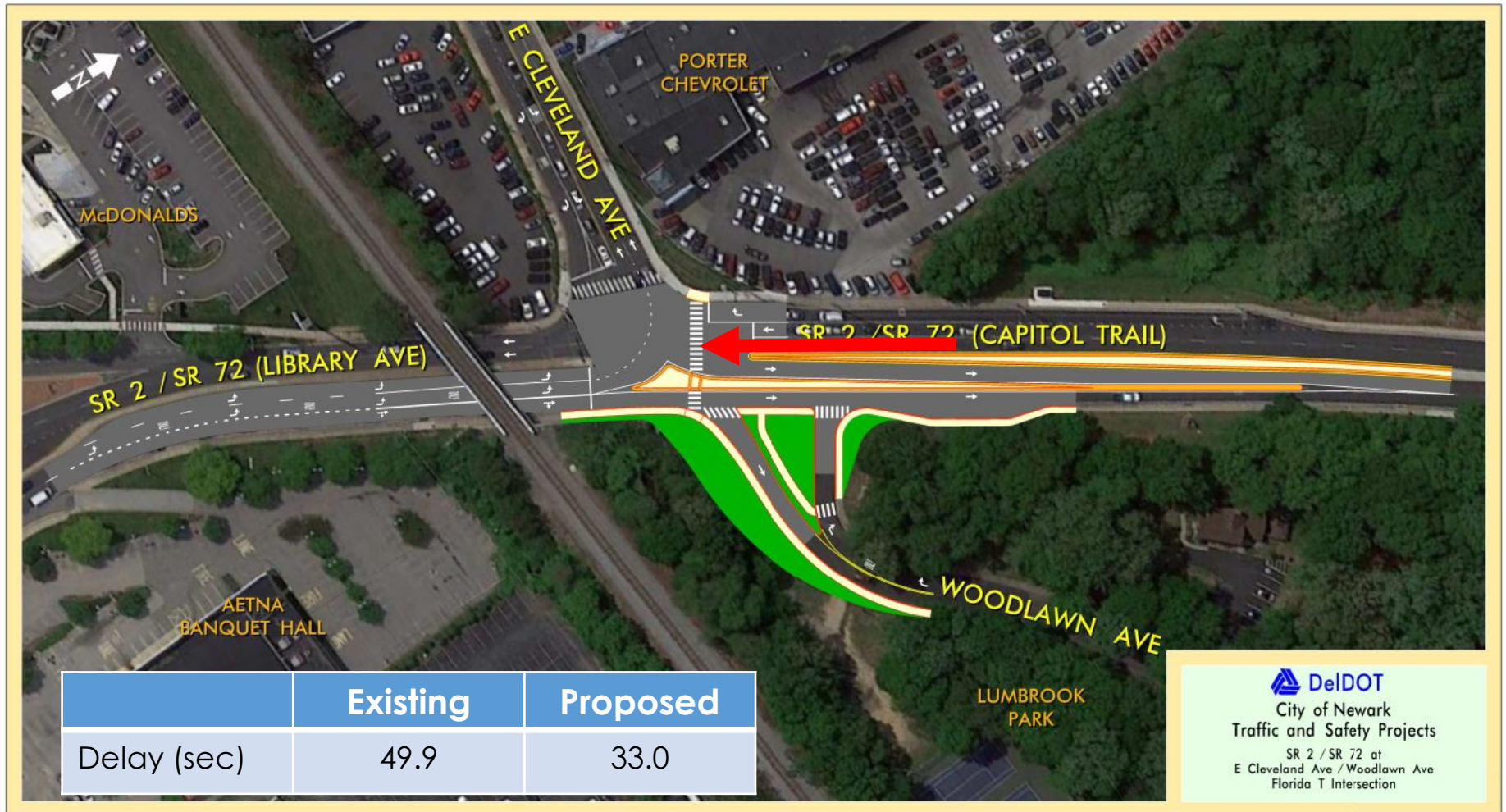
1,207 vehicles per hour



SITE P SR 2/SR 72/Woodlawn Ave – Florida T Concept

SB thru – AM peak

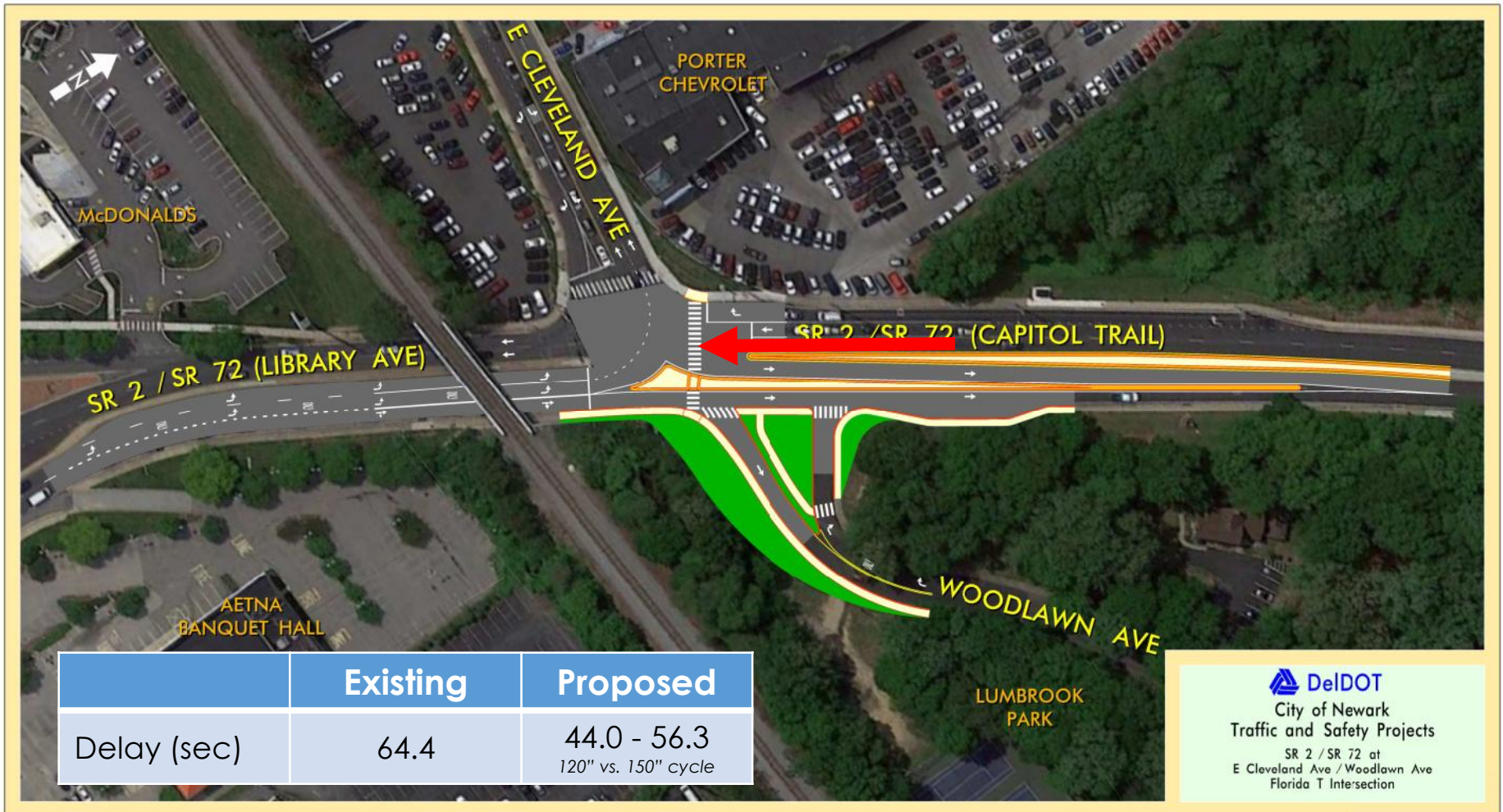
952 vehicles per hour



SITE P SR 2/SR 72/Woodlawn Ave – Florida T Concept

SB thru – PM peak

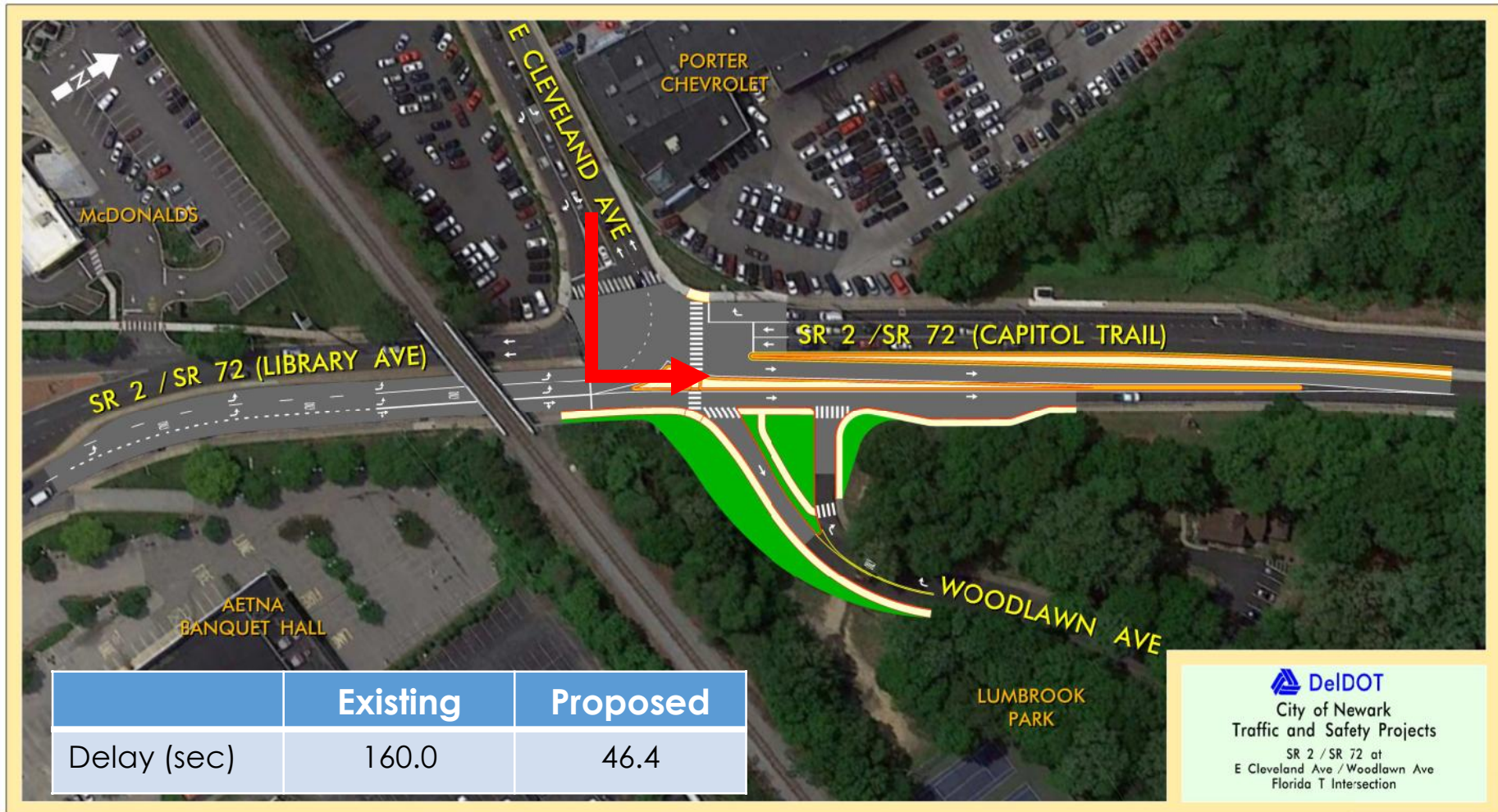
844 vehicles per hour



SITE P SR 2/SR 72/Woodlawn Ave – Florida T Concept

EB left – AM peak

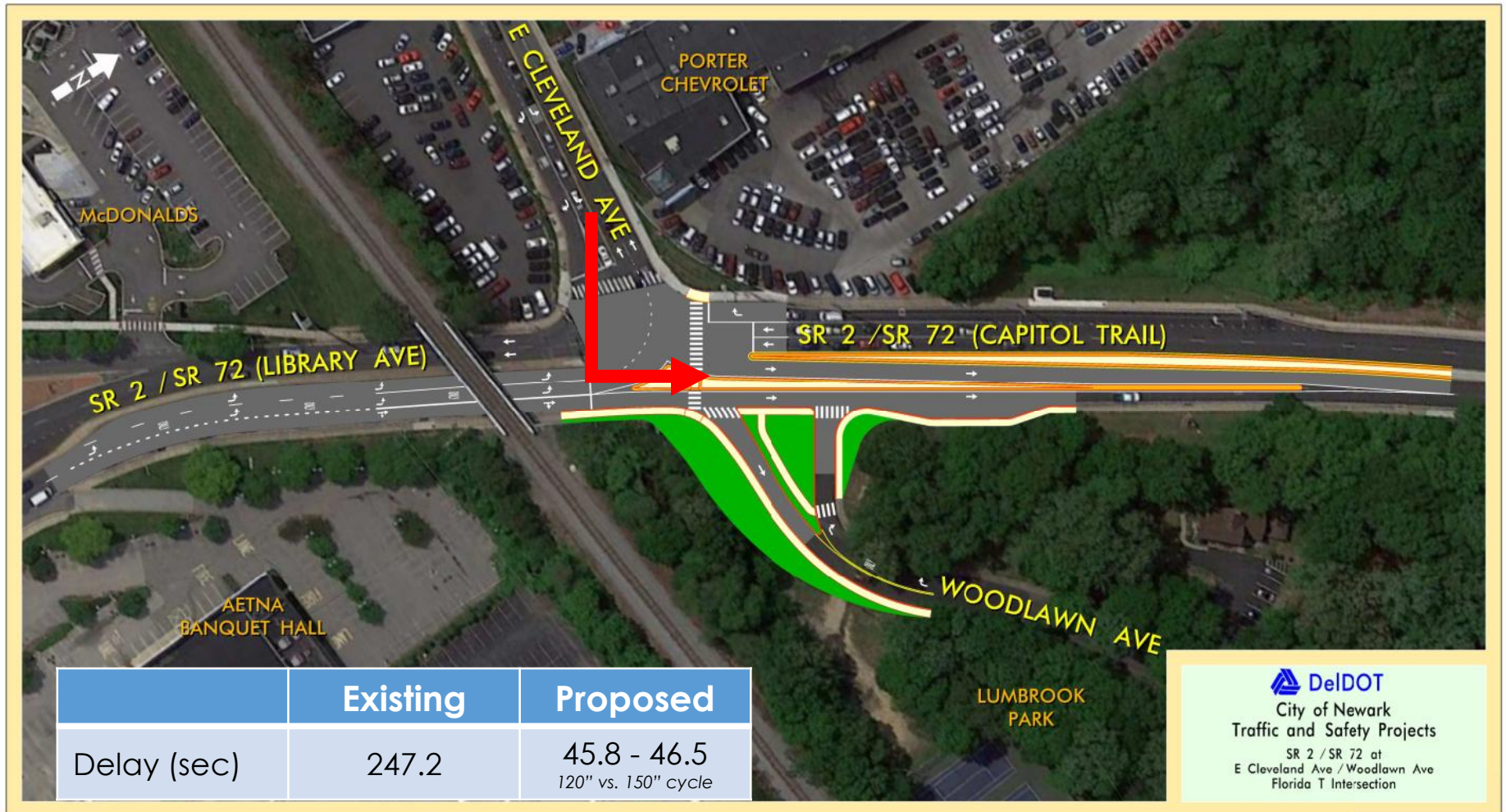
302 vehicles per hour



SITE P SR 2/SR 72/Woodlawn Ave – Florida T Concept

EB left – PM peak

423 vehicles per hour



SITE P

SR 2/SR 72/Woodlawn Ave – Florida T Concept

Diverted SB U-turns

20 to 30 vehicles per day



SITE P

SR 2/SR 72/Woodlawn Ave – Florida T Concept

Diverted SB U-turns

Concrete island alteration



SITE P

SR 2/SR 72/Woodlawn Ave – Florida T Concept

SB U-turning ambulance

Concrete island alteration



SITE P

SR 2/SR 72/Woodlawn Ave – Florida T Concept

Anna Way lefts – AM peak 20" split; 60" cycle



SITE P

SR 2/SR 72/Woodlawn Ave – Florida T Concept

Anna Way lefts – AM peak 20" split; 60" cycle



SITE P

SR 2/SR 72/Woodlawn Ave – Florida T Concept

Anna Way lefts – PM peak 30" split; 120" cycle



SITE P

SR 2/SR 72/Woodlawn Ave – Florida T Concept

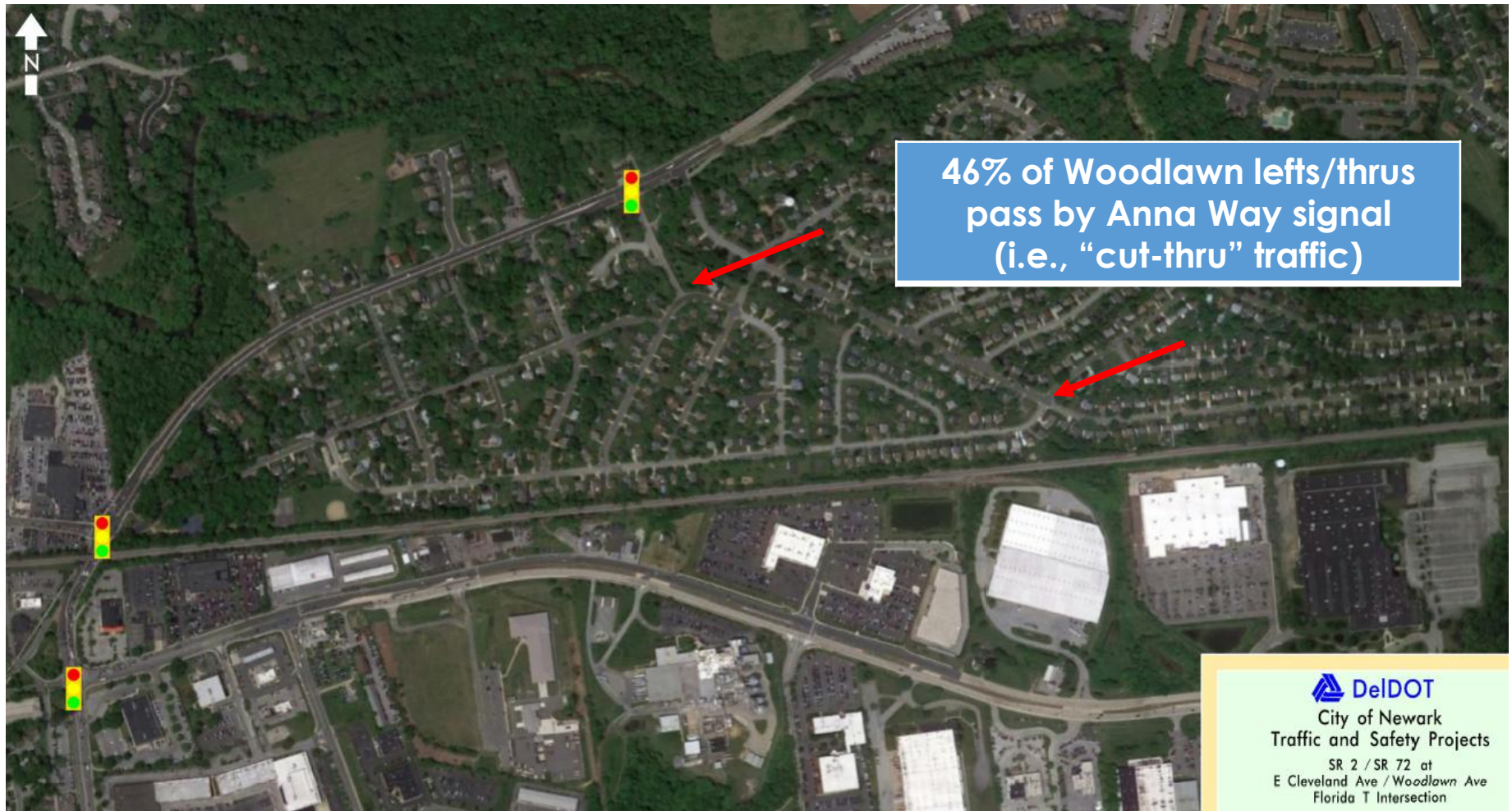
Anna Way lefts – PM peak 30" split; 120" cycle



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SR 2/SR 72/Woodlawn Ave – Florida T Concept

Neighborhood traffic circulation counts



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SR 2/SR 72/Woodlawn Ave – Florida T Concept

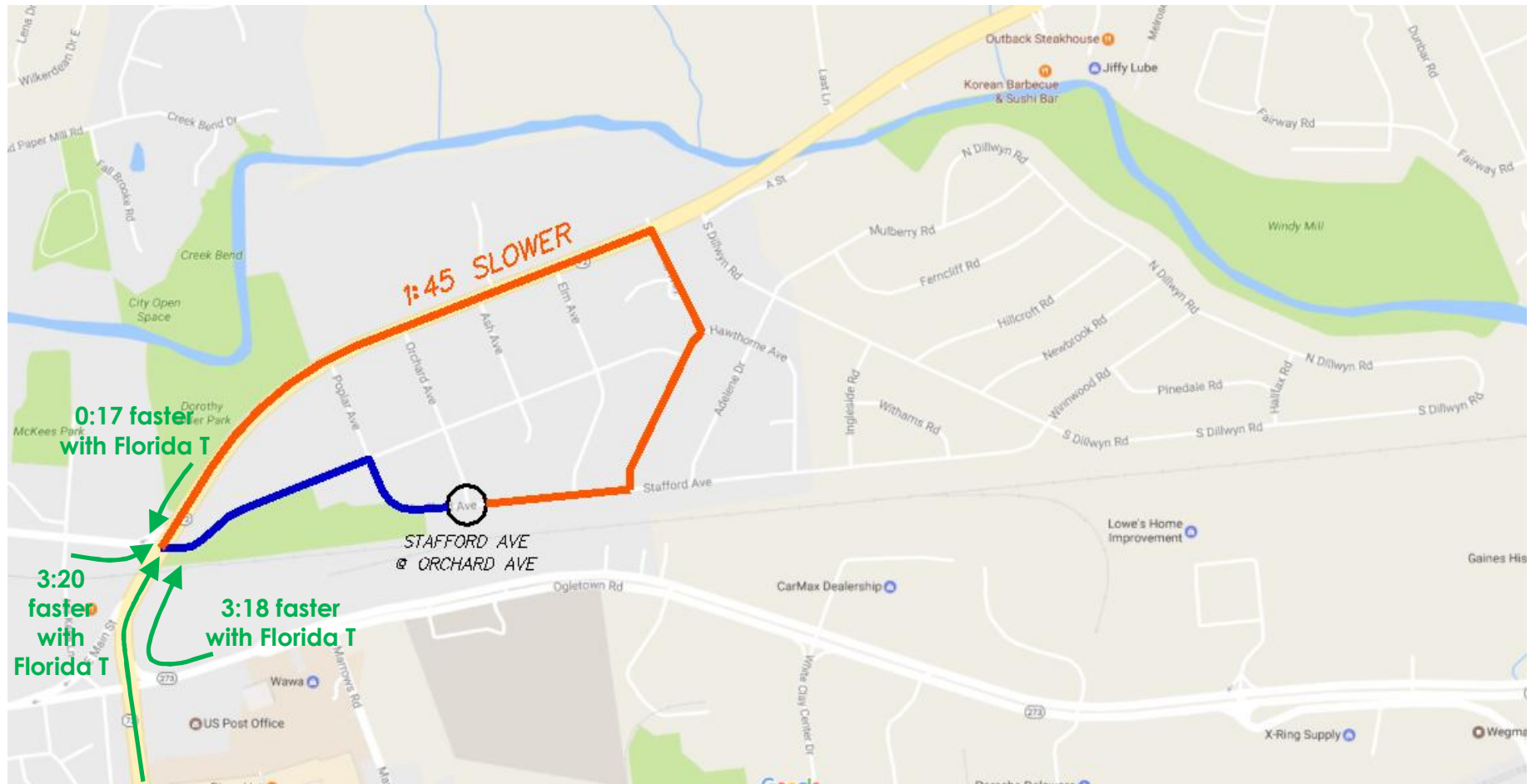
Travel time runs – Woodlawn Ave vs. Anna Way

- Outbound comparison from 4 locations in neighborhood
- 2-4 runs from each location; averaged results presented
- Performed during AM peak – highest exiting traffic volumes
- Methodology
 - 2 vehicles departed same location simultaneously
 - 1 exited at Anna Way and 1 exited at Woodlawn Ave
 - Drove posted speed limit
 - Recorded time to clear E. Cleveland Ave/Woodlawn Ave signal
- Reduced cycle length at Anna Way implemented 12/6/16

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SR 2/SR 72/Woodlawn Ave – Florida T Concept

“Round-trip” travel time – Woodlawn Ave vs. Anna Way

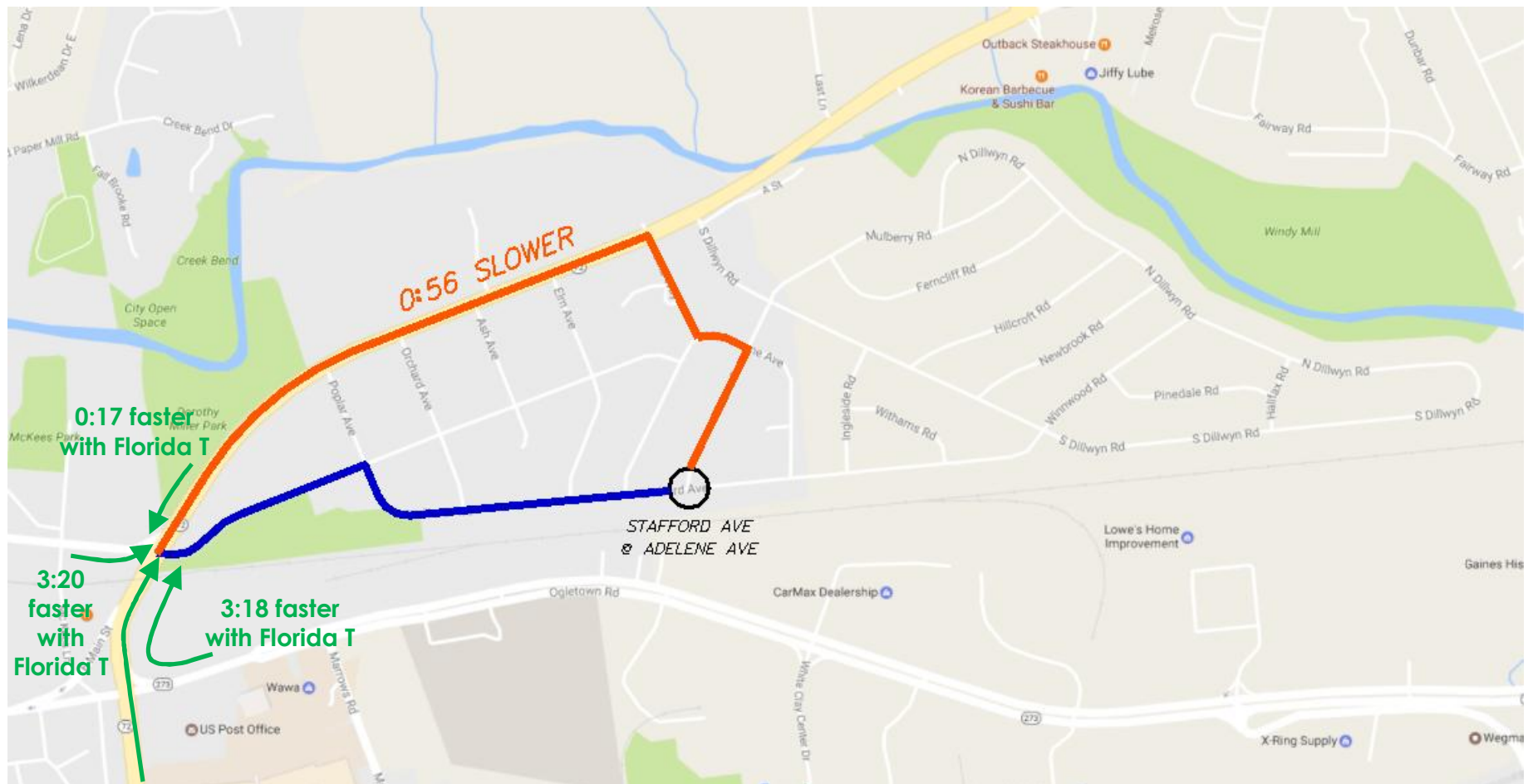


Approx. 7:00 faster
with Florida T
(from Wyoming Ave)

SITE P

SR 2/SR 72/Woodlawn Ave – Florida T Concept

“Round-trip” travel time – Woodlawn Ave vs. Anna Way

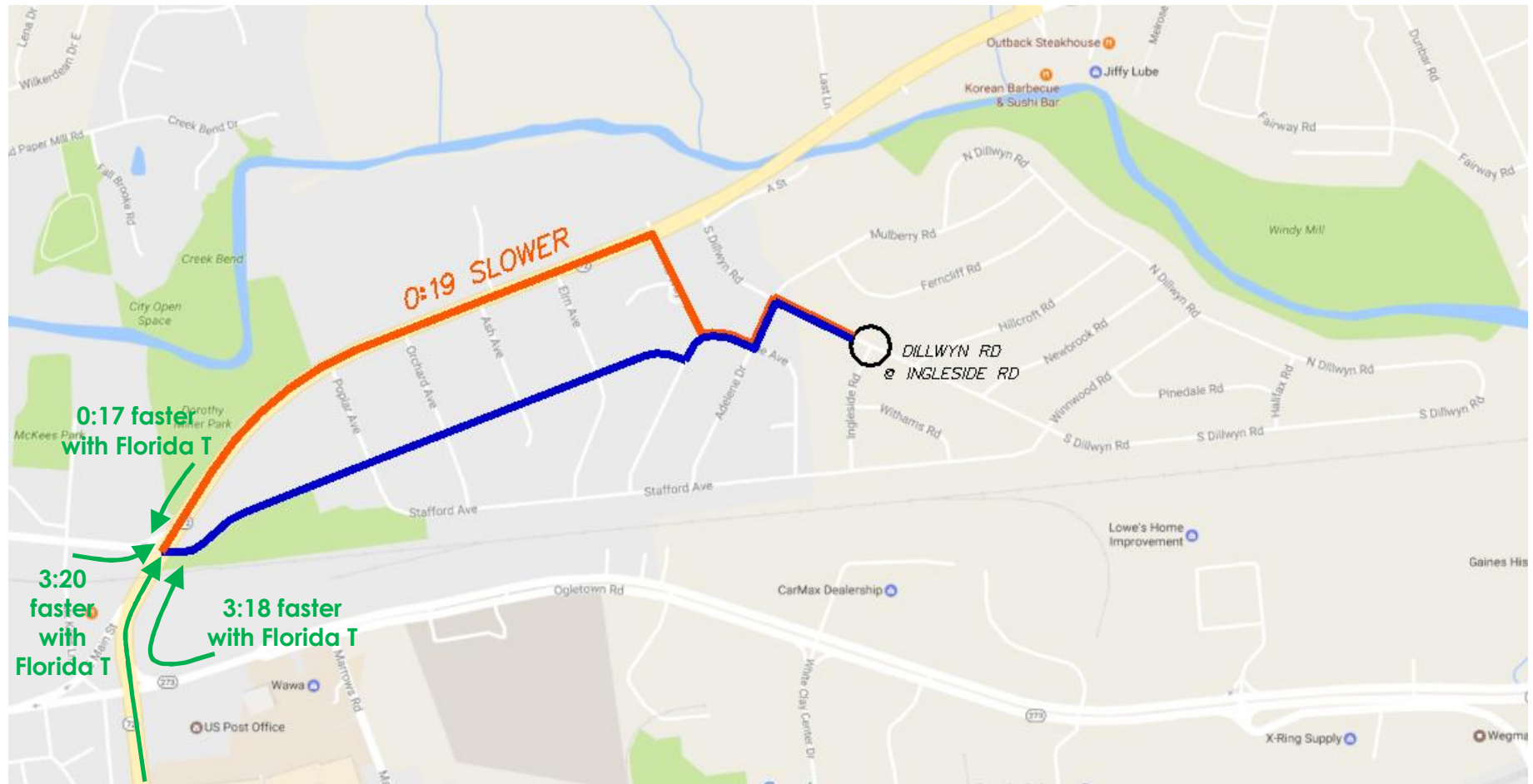


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SR 2/SR 72/Woodlawn Ave – Florida T Concept

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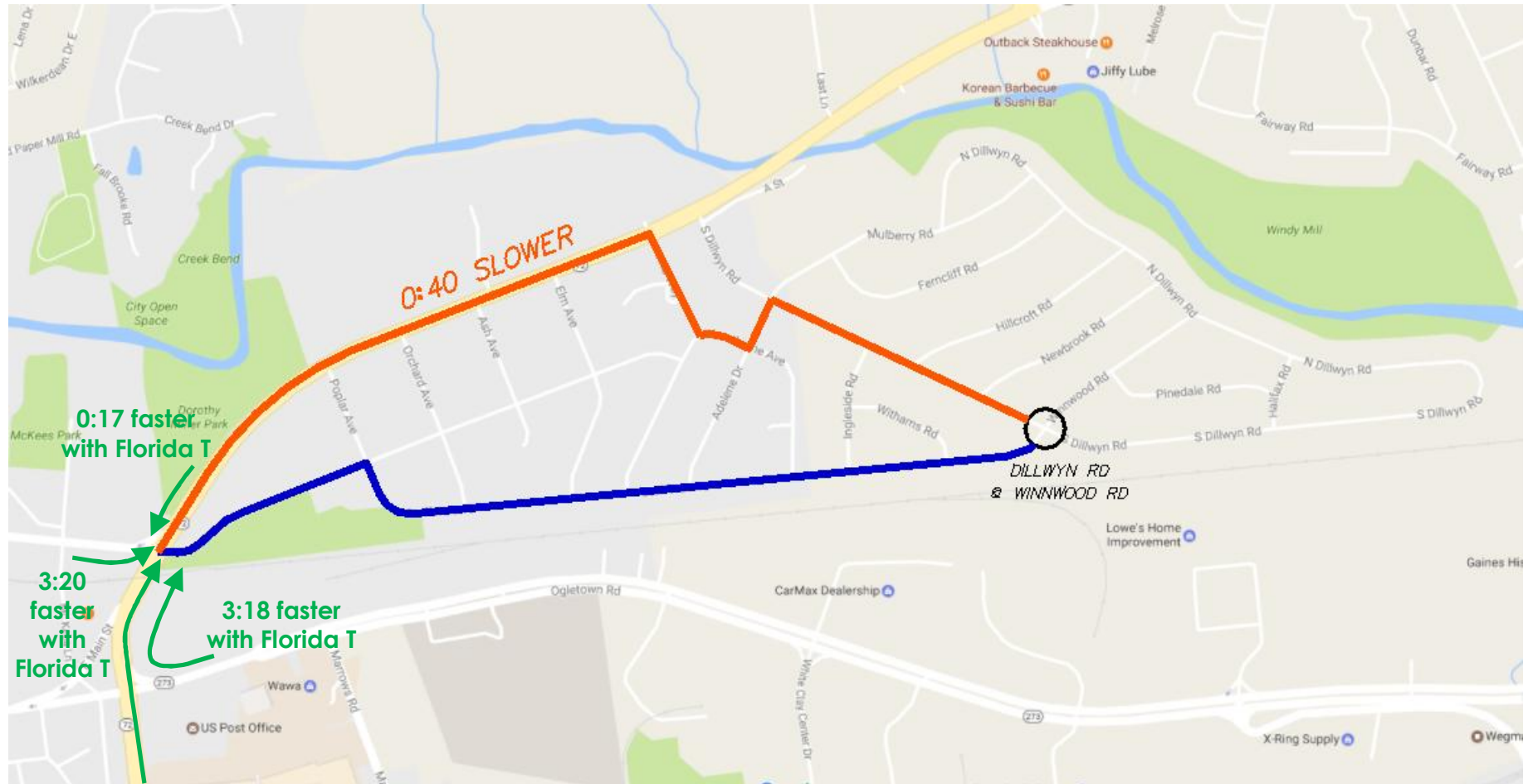


Approx. 7:00 faster
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SR 2/SR 72/Woodlawn Ave – Florida T Concept

“Round-trip” travel time – Woodlawn Ave vs. Anna Way

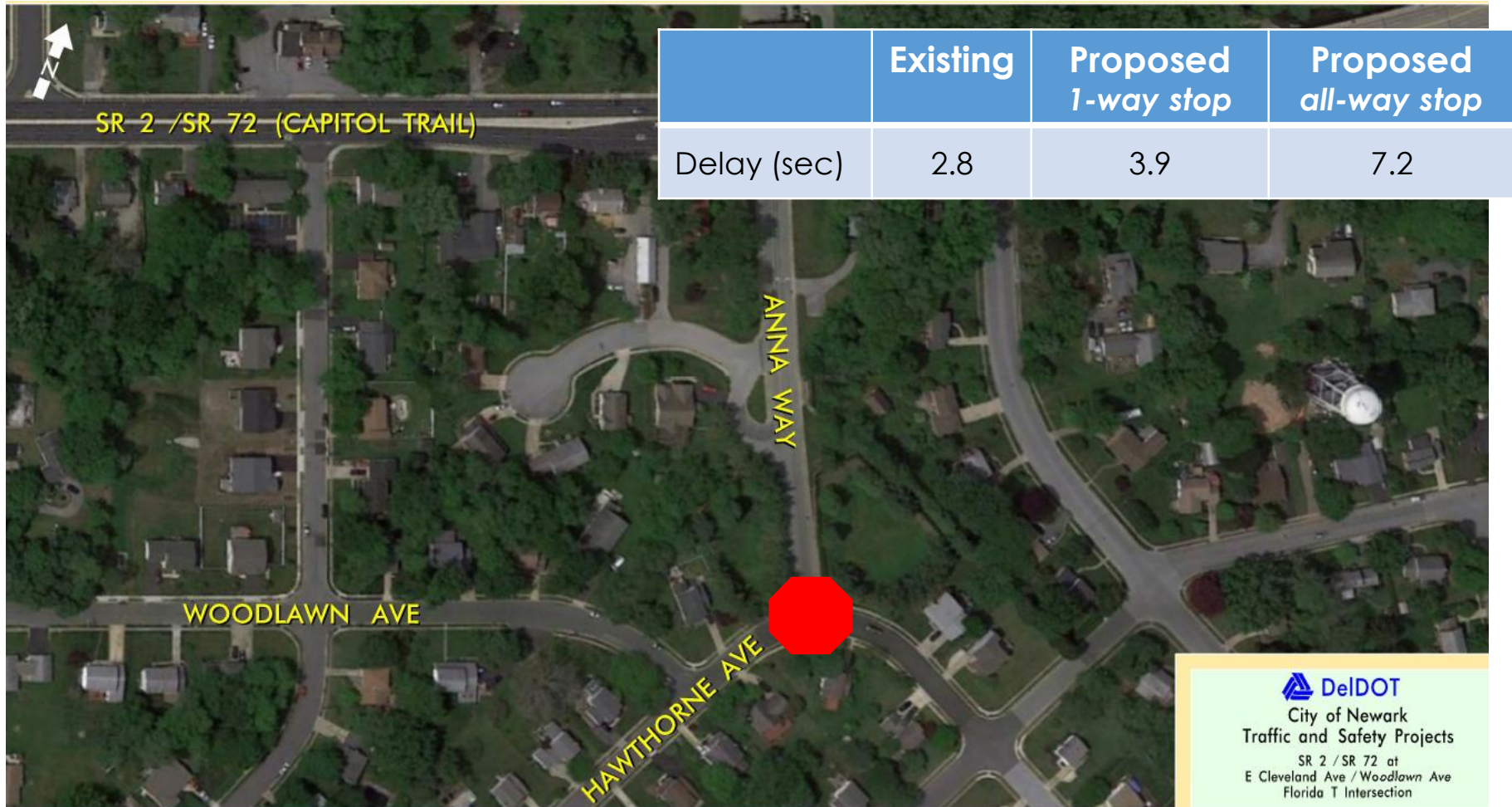


Approx. 7:00 faster
with Florida T
(from Wyoming Ave)

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SR 2/SR 72/Woodlawn Ave – Florida T Concept

Anna @ Hawthorne stop control – AM peak



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SR 2/SR 72/Woodlawn Ave – Florida T Concept

Ambulance turning paths



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SR 2/SR 72/Woodlawn Ave – Florida T Concept

Pumper fire truck turning paths



SITE P

SR 2/SR 72/Woodlawn Ave – Florida T Concept

Aerial fire truck turning paths



SITE P

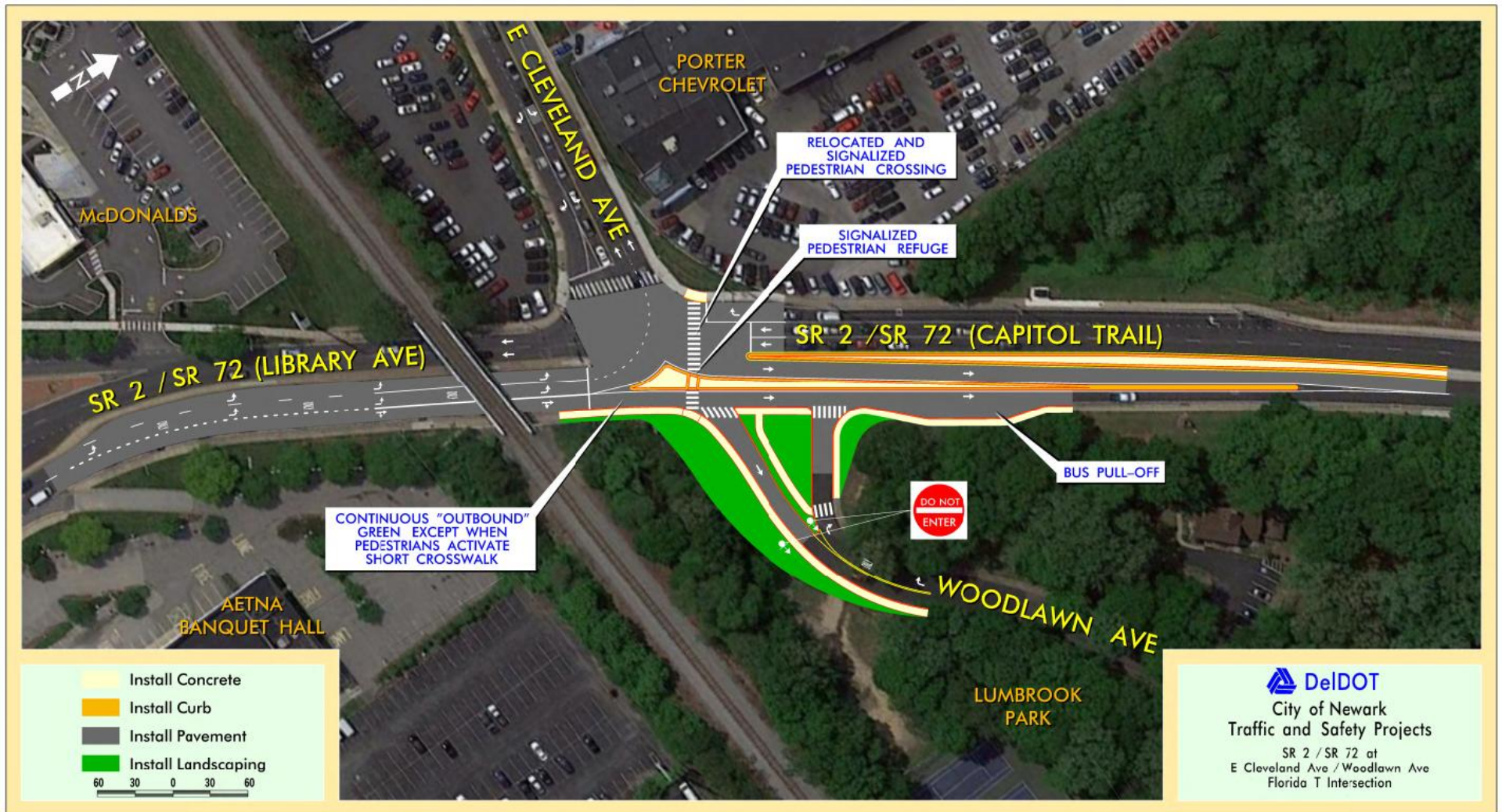
SR 2/SR 72/Woodlawn Ave – Florida T Concept

AETNA HH&L feedback

- Easier access and quicker responder arrival times to Station 8
- Improved response times to north and northeast
- Siren use currently discontinued due to intersection congestion
- Anna Way is preferred entrance due to wider lane widths
- Neighborhood turning paths are adequate (e.g., Hawthorne Ave)
- Additional “emergency vehicle only” median crossover is not needed
- E. Main St/SR 273 U-turn improvements will allow Aetna vehicles to turn easier
- No specific concerns for properties on north/west side of Capitol Trail U-turning at E. Main St/SR 273
- Supportive of HFST on Anna Way and higher priority snow removal
- Maximize lane width for NB thru lane “cattle chute”

SITE P SR 2/SR 72/Woodlawn Ave – Florida T Concept

Frequently asked questions & Mar. 6, 2017 action items



SITE P SR 2/SR 72/Woodlawn Ave – Florida T FAQs


FAQ: Are Florida T case studies available?

Intersection Safety Case Study

Continuous Green T-Intersections

This case study is one in a series documenting successful intersection safety treatments and the crash reductions that were experienced. Traffic engineers and other transportation professionals can use the information contained in this case study to answer the following questions:

- What is an innovative treatment option to reduce injury and angle crashes at T-intersections in rural areas?
- How many crashes did this treatment reduce?
- Are there any implementation issues associated with this treatment and, if so, how can they be overcome?




U.S. Department of Transportation
Federal Highway Administration
FHWA-SA-09-016

Safe Roads for a Safer Future
Investment in roadway safety saves lives

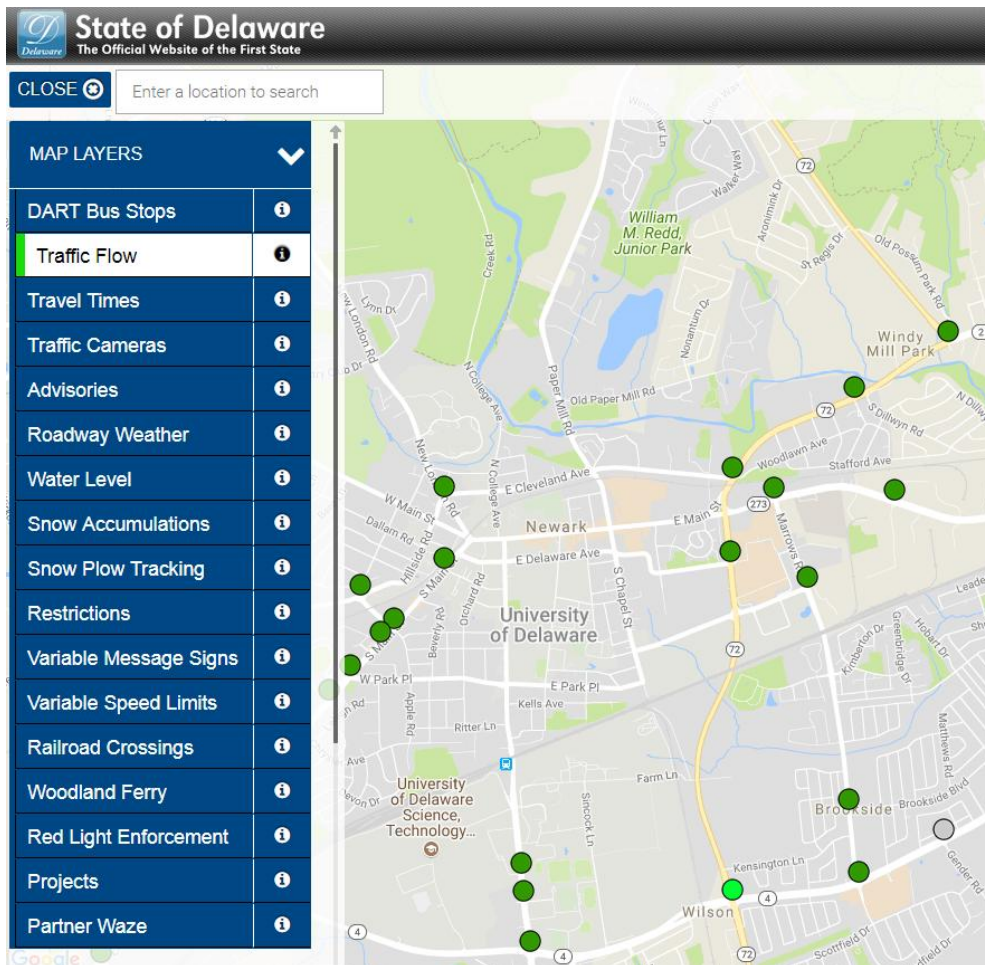
"Based on the operational and crash analysis conducted, it was concluded that road designs such as CGTs offer a substantial improvement in safety as well as volume of throughput. Public acceptance was very high and it is one of those treatments that the traveling public agrees 'makes sense'"

Zane Znamenacek
Traffic Engineer
Colorado Department of Transportation (CDOT)



The safety enhancements discussed in this case study were added to reduce angle, injury and total crashes. Implementation of the CGT cumulatively reduced angle crashes at the treated intersections by 96.8 percent, injury crashes by 70 percent, and total crashes by 60 percent.

FAQ: What data is available to validate the traffic models?

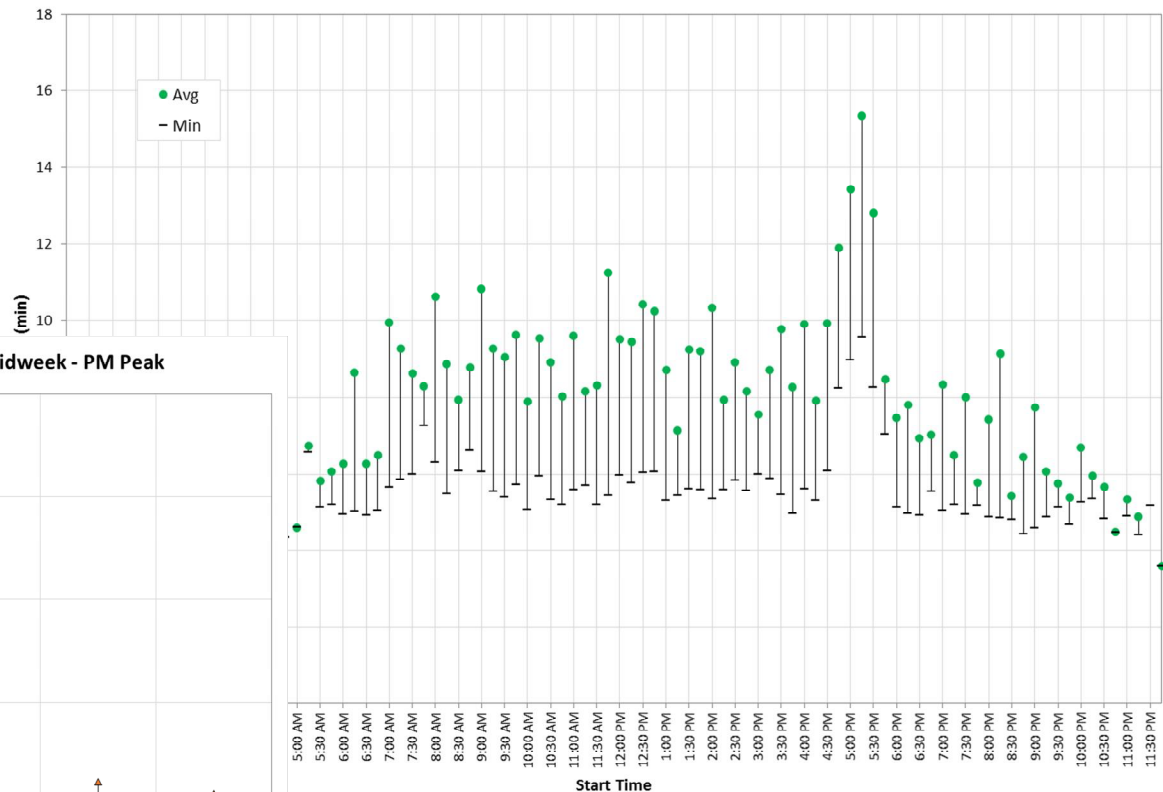


Corridor Signal Coordination Study
Delaware Route 72

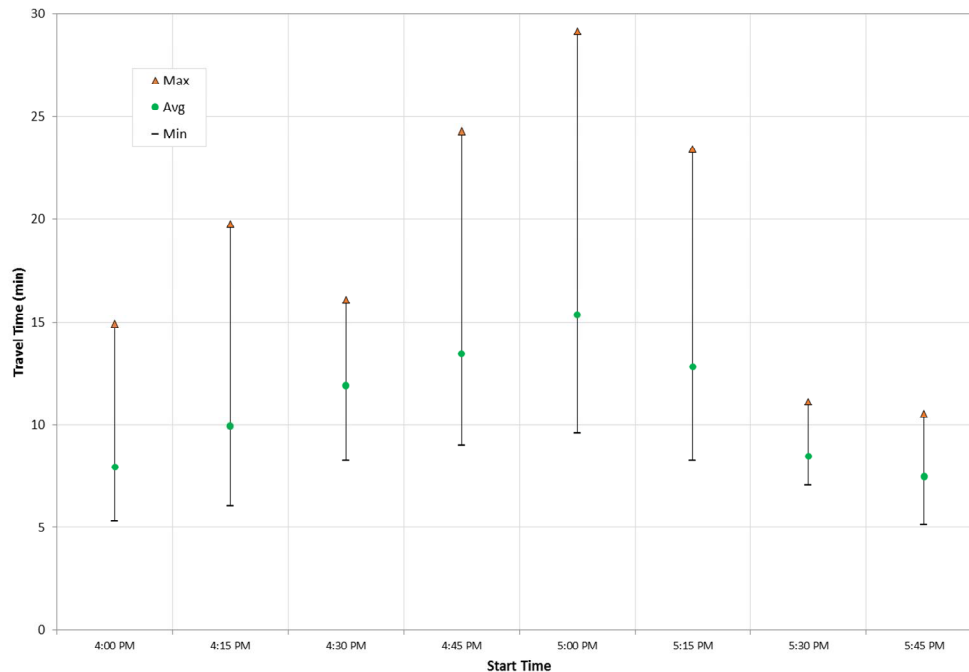
	PM			Northbound			Southbound		
	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3
Total time:	0:10:36	0:16:56	0:26:22				0:08:23	0:09:09	0:08:17
Intersections:									
SR 72 @ Main St	0:02:44	0:03:14	0:05:25						
SR 72 @ Delaware Ave	0:00:44	0:03:01	0:05:24				0:00:23	0:00:21	0:00:24
SR 72 @ Wyoming	0:04:03	0:06:26	0:12:53				0:00:21	0:01:34	0:01:31
SR 72 @ Pencader Plz	0:00:51	0:01:34	0:01:11				0:03:29	0:03:04	0:03:32
SR 72 @ Scottfield	0:00:19	0:00:33	0:00:25				0:00:39	0:00:48	0:00:46
SR 72 @ Dawson Dr							0:00:23	0:00:31	0:00:23
Average speed (mph):	18.44	11.56	6.90				22.27	19.48	21.16
# stops:	4	8	12				3	4	4
Stopped time (<5 mph):	0:03:06	0:08:06	0:13:23				0:02:49	0:03:00	0:01:50
Congest time (<20 mph):	0:05:27	0:10:55	0:22:03				0:03:43	0:04:15	0:03:09
Time run started:	16:14:58	16:33:45	16:59:11				16:08:19	16:26:35	16:51:42
	**For a permitted error of 4.0 mph, 3 runs are sufficient						**For a permitted error of 2.0 mph, 3 runs are sufficient		

FAQ: What data is available to validate the traffic models?

SR 2/72 NB Travel Time, SR 4 to Possum Park Rd, October 2017 Midweek

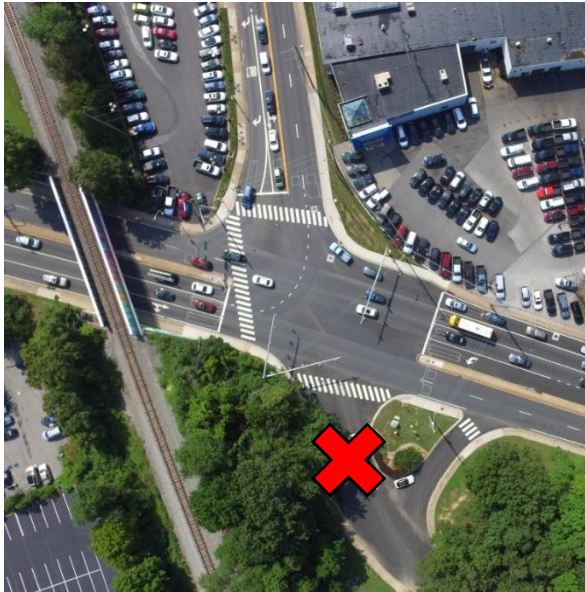


SR 2/72 NB Travel Time, SR 4 to Possum Park Rd, October 2017 Midweek - PM Peak



SITE P

SR 2/SR 72/Woodlawn Ave – Florida T FAQs



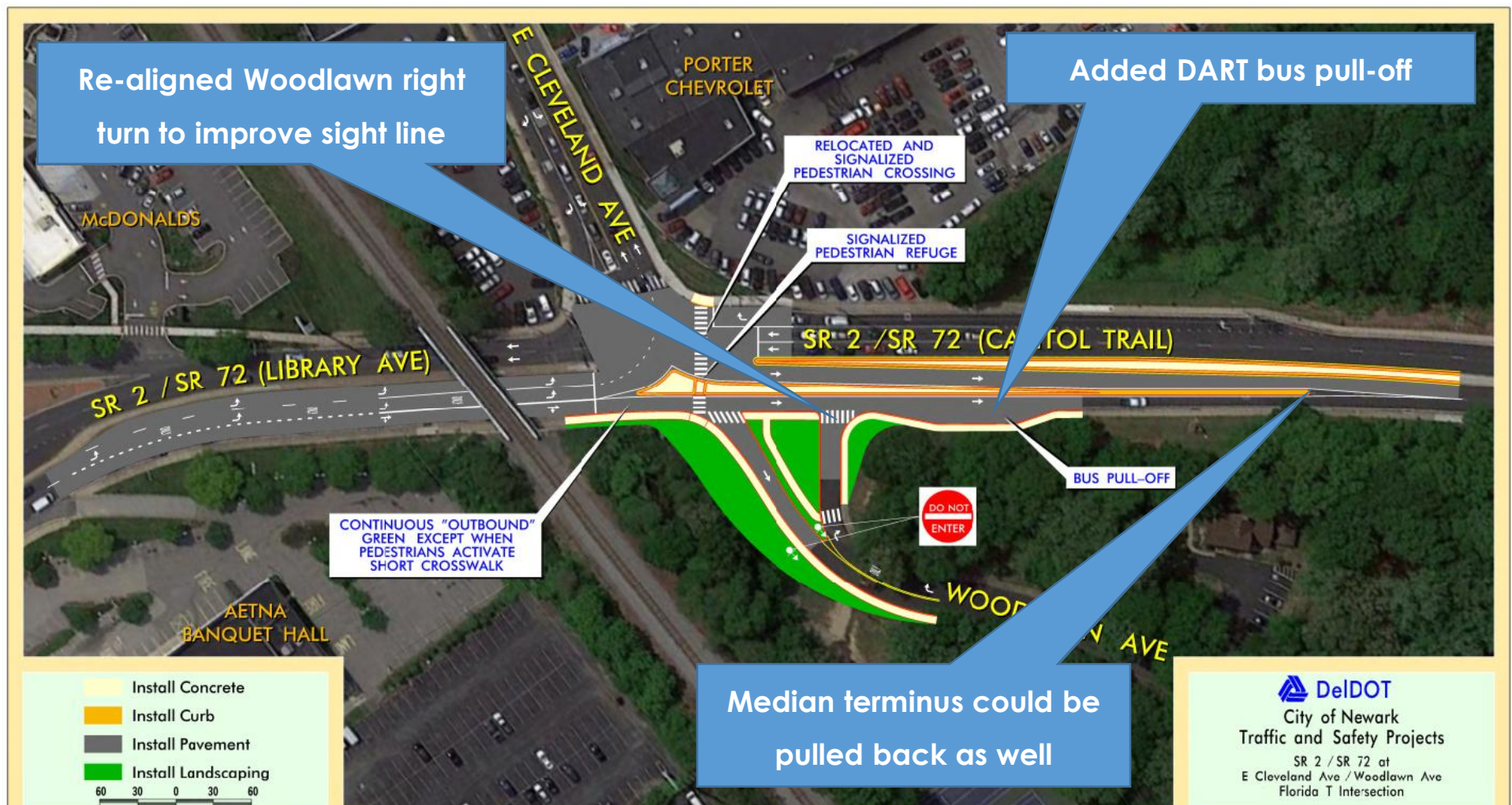
FAQ: Why can't we simply skip the Woodlawn signal phase?

PM Peak with omitting Woodlawn Ave signal phase				
	Intersection delay (sec)	NB T (sec)	SB T (sec)	EB L (sec)
Existing	115.9	199.6	64.4	247.2
8" added to NB T	78.6	102.2	59.0	207.4
8" added to SB T	98.4	162.7	48.7	207.4
8" added to EB L	90.4	162.7	59.0	121.9
** 2" & 2" added to other two approaches				
Florida T (120")	23.6	1.8	44.0	45.8

SITE P SR 2/SR 72/Woodlawn Ave – Florida T FAQs

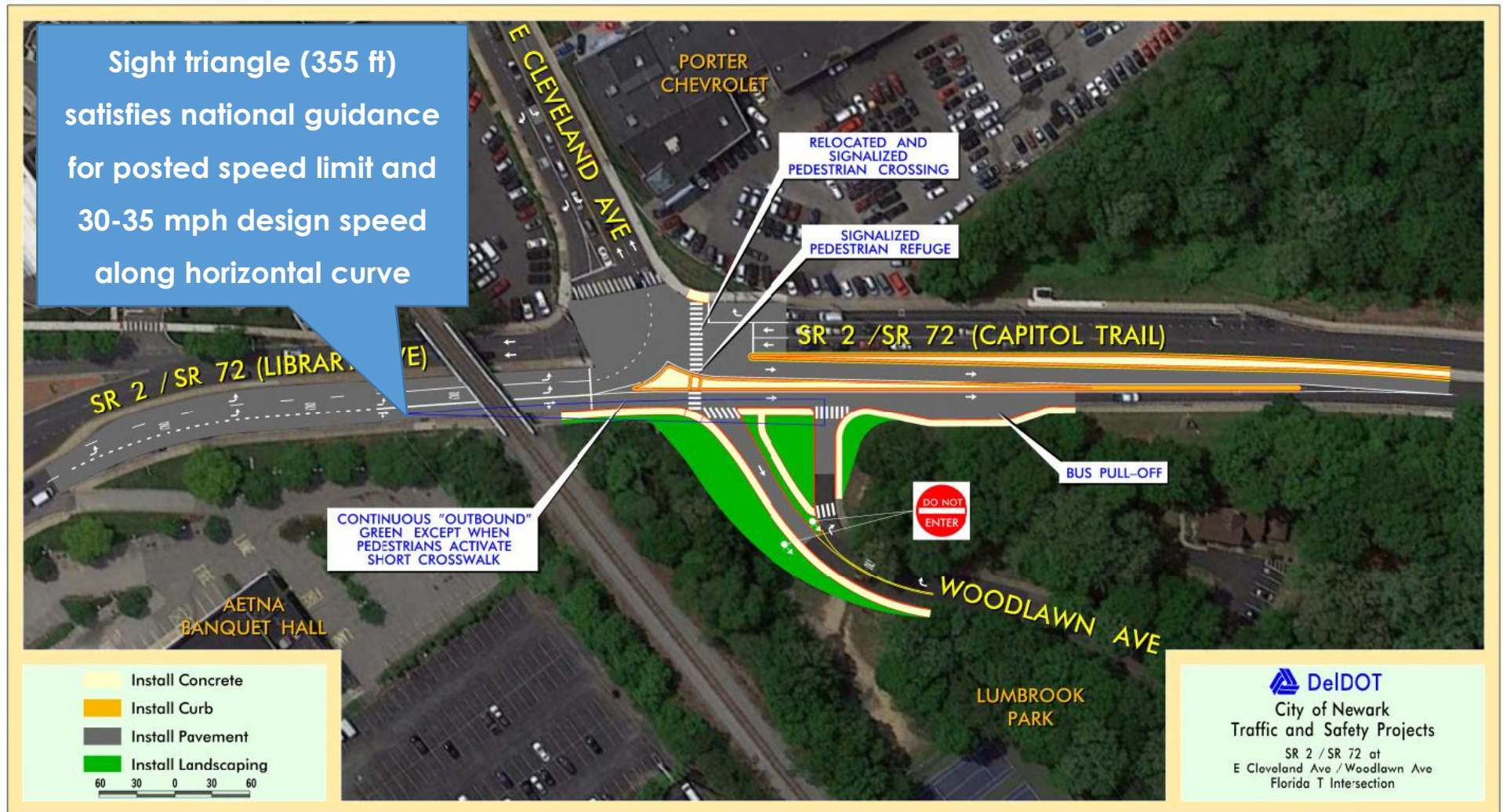
FAQ: Is the image below the absolute final configuration?

No – see examples of design features below that have been adjusted since March 6, 2017 presentation



SITE P SR 2/SR 72/Woodlawn Ave – Florida T FAQs

FAQ: Will sight lines for Woodlawn right turns be blocked by the RR bridge?



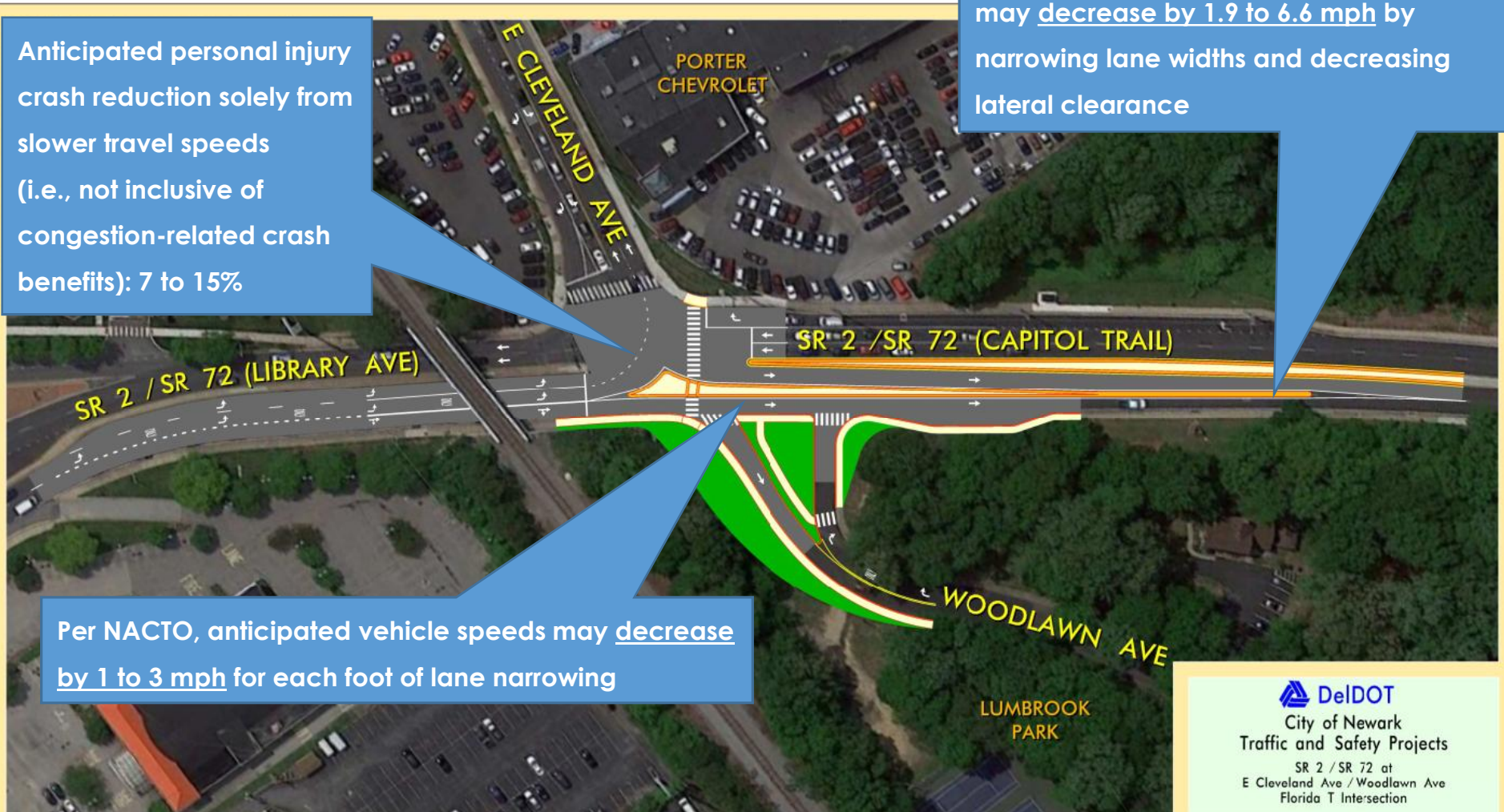
SITE P SR 2/SR 72/Woodlawn Ave – Florida T FAQs

FAQ: Will the continuous green increase vehicle speeds?

Anticipated personal injury crash reduction solely from slower travel speeds (i.e., not inclusive of congestion-related crash benefits): 7 to 15%

Per the HCM, anticipated vehicle speeds may decrease by 1.9 to 6.6 mph by narrowing lane widths and decreasing lateral clearance

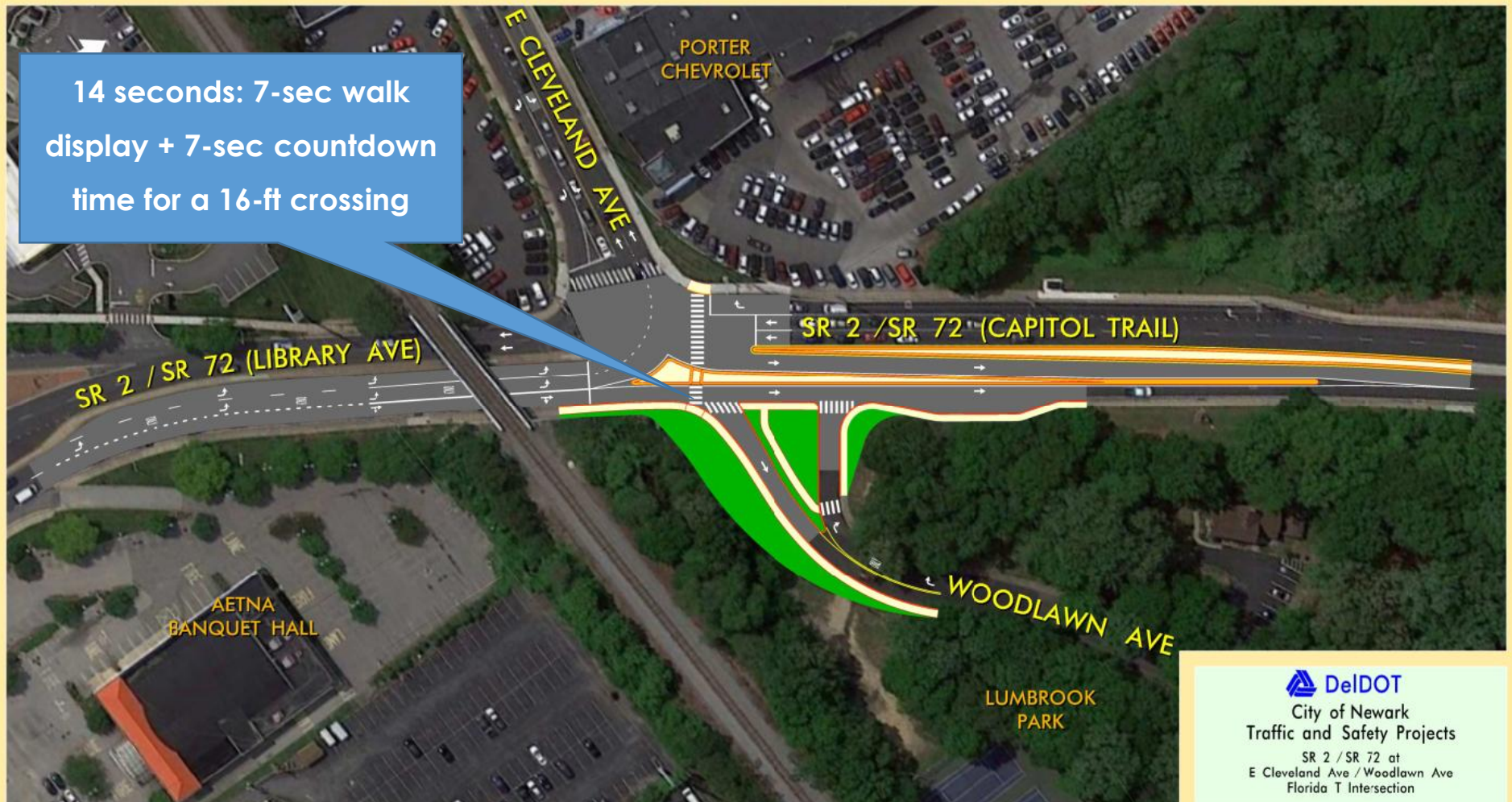
Per NACTO, anticipated vehicle speeds may decrease by 1 to 3 mph for each foot of lane narrowing



SITE P SR 2/SR 72/Woodlawn Ave – Florida T FAQs

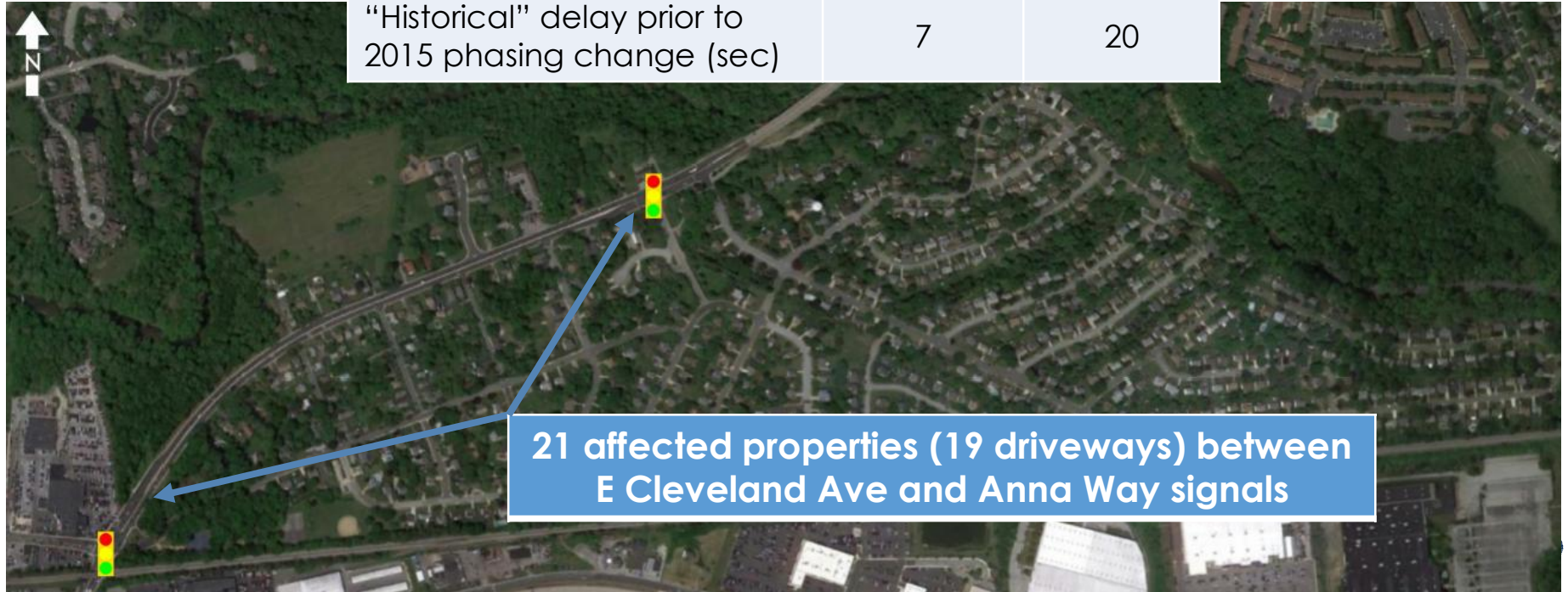
FAQ: How long will the pedestrian signal phase interrupt the continuous green?

14 seconds: 7-sec walk display + 7-sec countdown time for a 16-ft crossing



SITE P SR 2/SR 72/Woodlawn Ave – Florida T FAQs**FAQ: Will there be gaps in traffic to exit my driveway?**

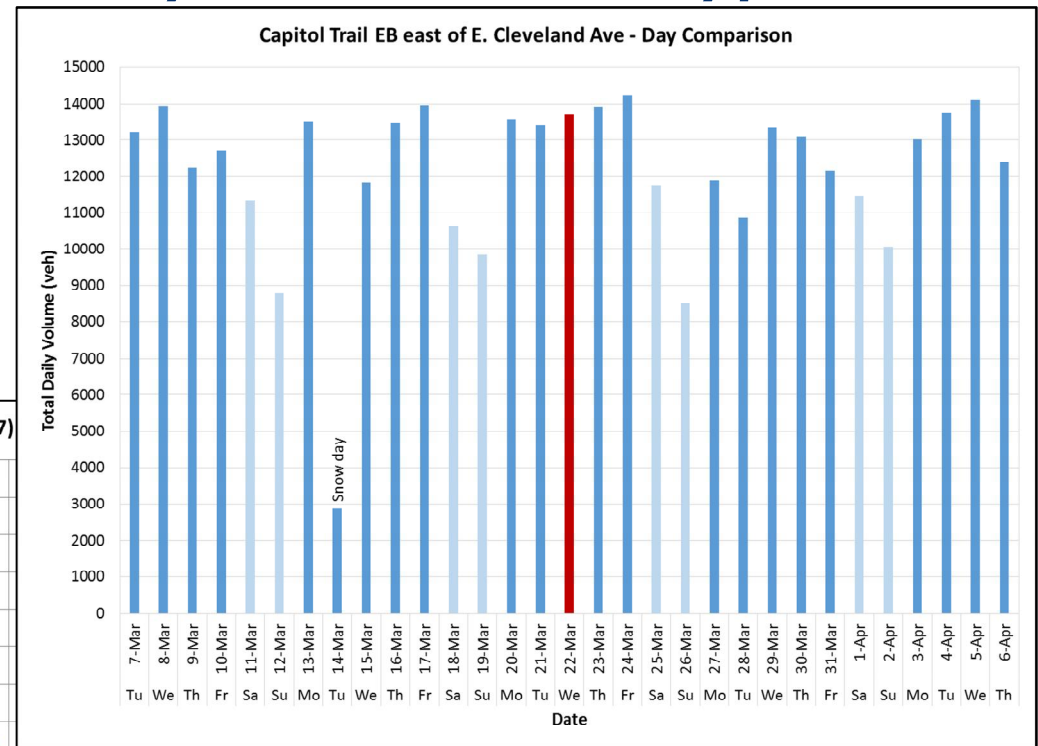
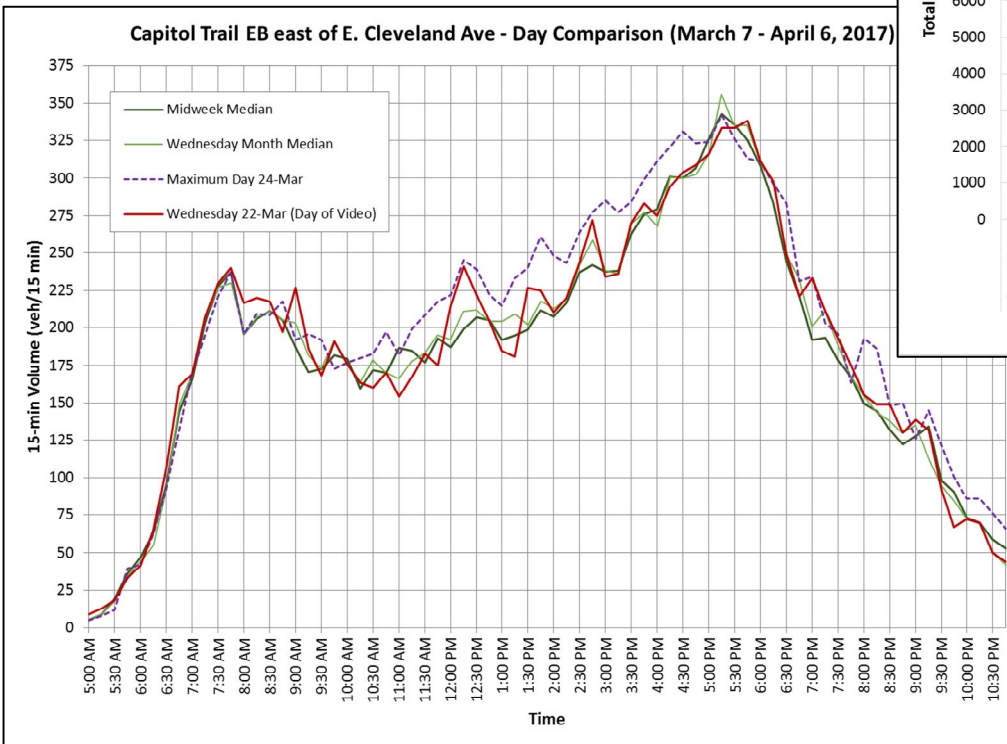
Capitol Trail Driveways	AM Peak	PM Peak
Acceptable gaps (gaps/hr)	77	45
Field-measured average delay (sec)	5	14
SimTraffic projected delay increase with Florida T (sec)	+3	+6
"Historical" delay prior to 2015 phasing change (sec)	7	20



SITE P

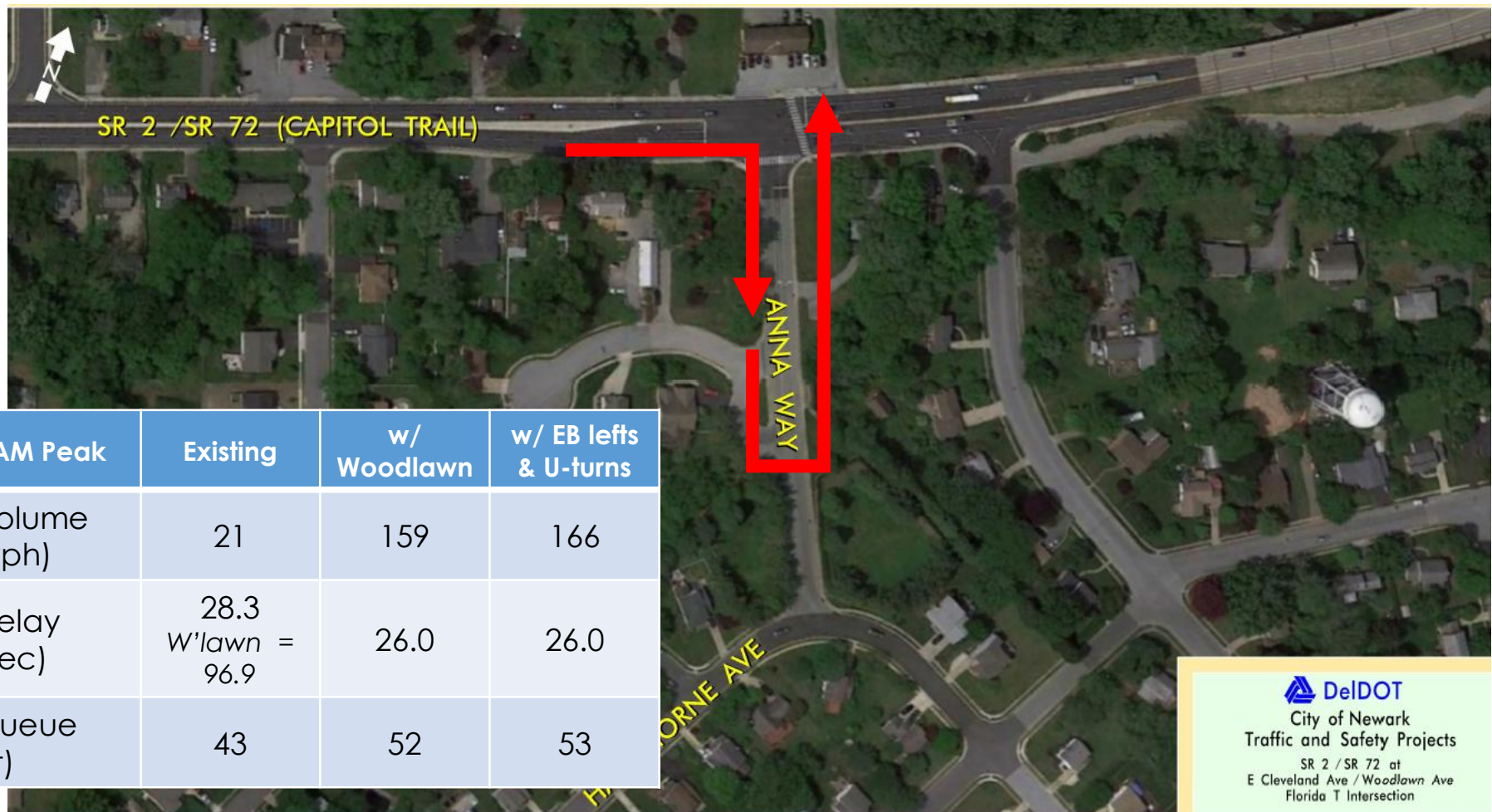
SR 2/SR 72/Woodlawn Ave – Florida T FAQs

FAQ: Does the 3/22/17 gap study data reflect a typical day along Capitol Trail?



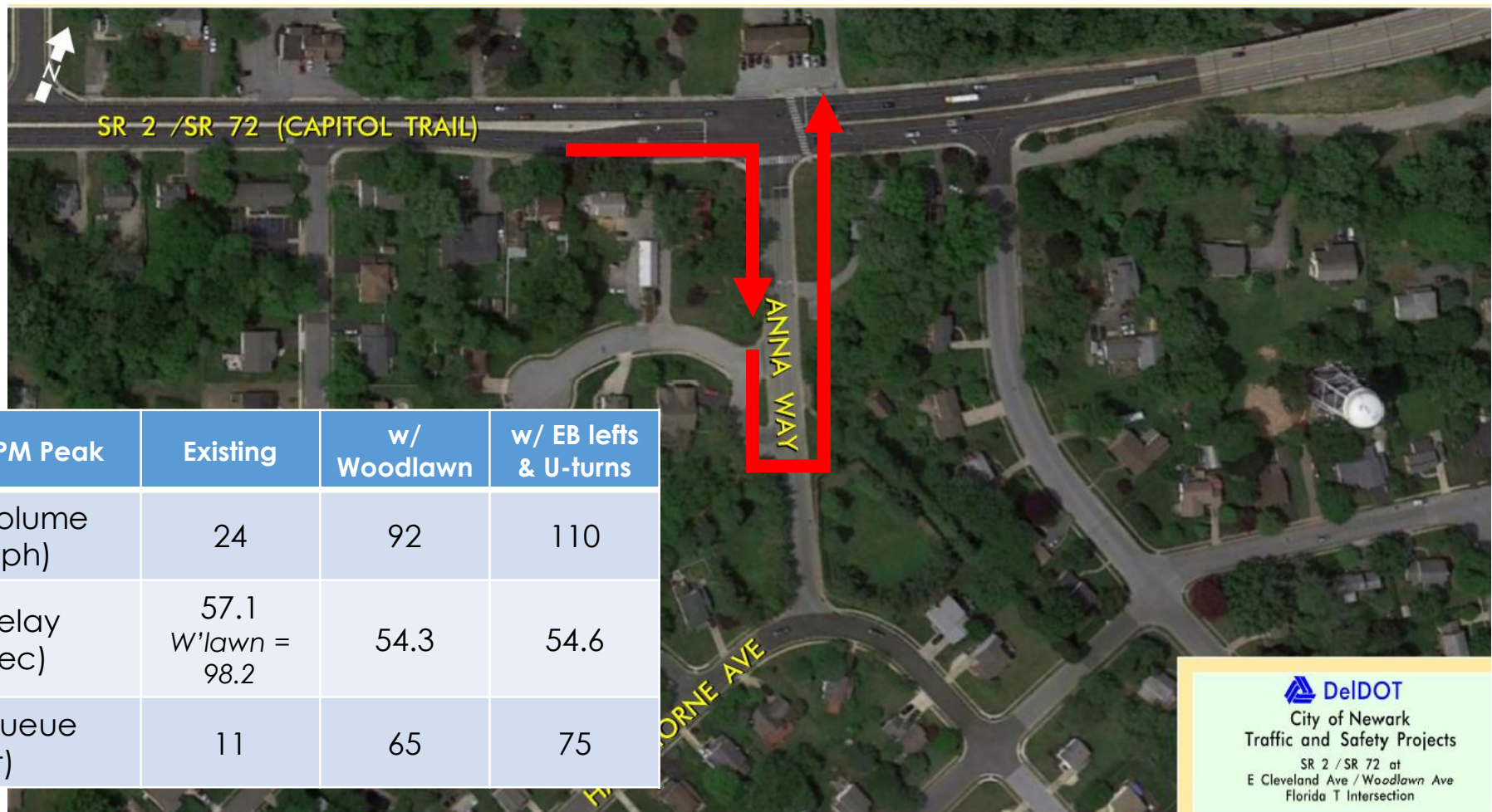
SITE P SR 2/SR 72/Woodlawn Ave – Florida T FAQs

FAQ: What happens if EB lefts and U-turns are prohibited at Anna Way (i.e., required to use jug-handle)?



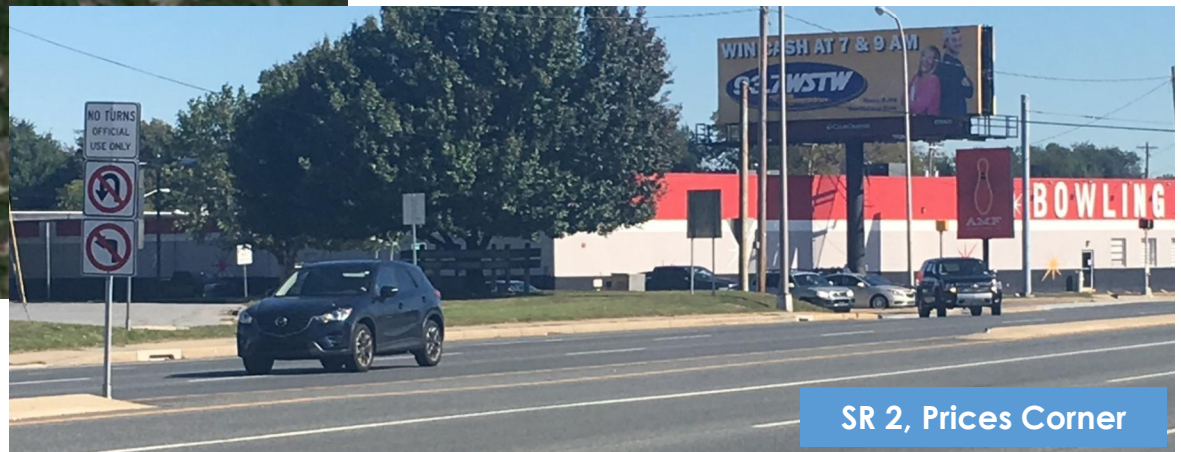
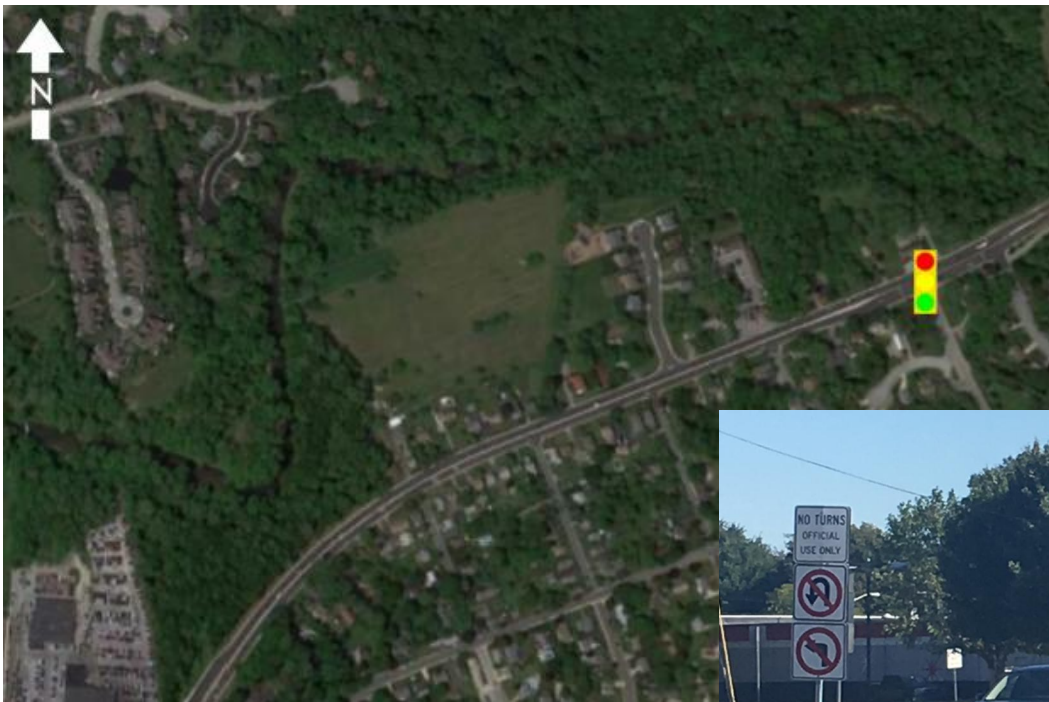
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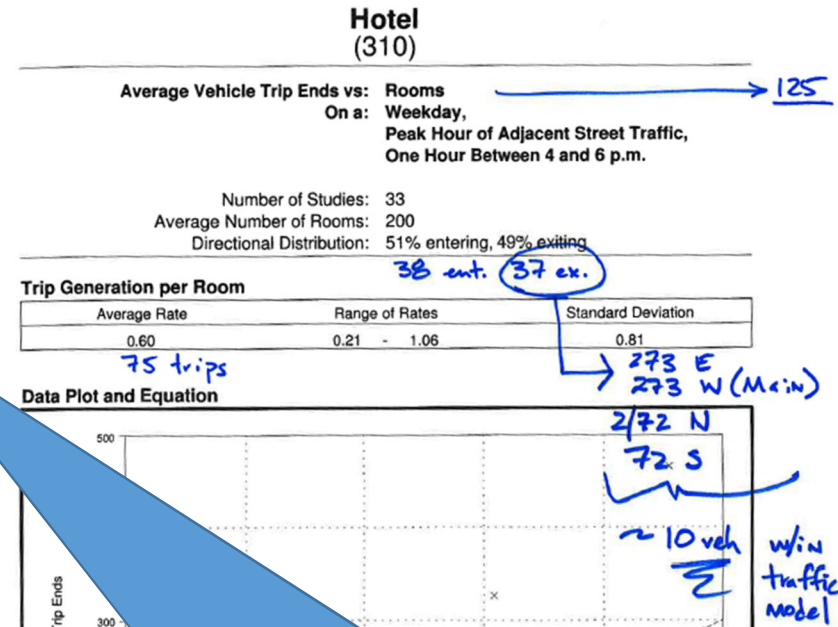
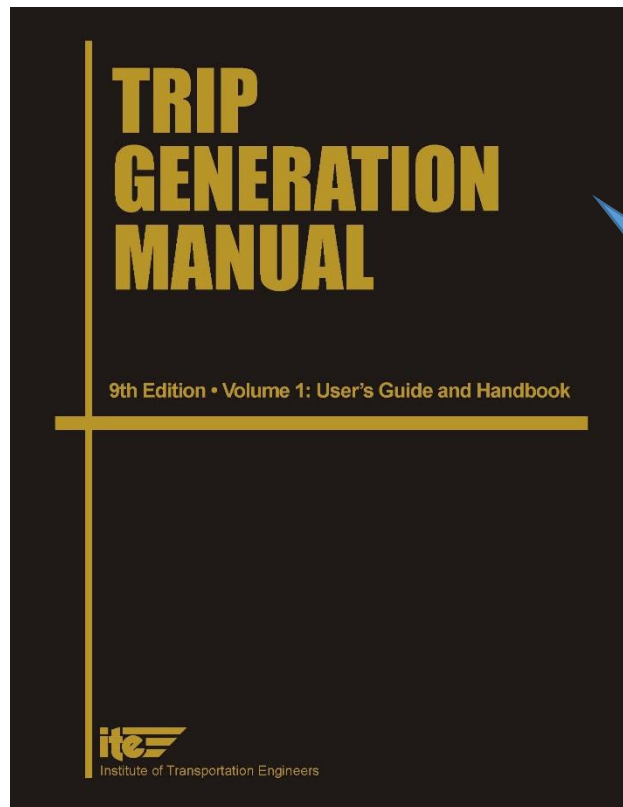
SITE P SR 2/SR 72/Woodlawn Ave – Florida T FAQs

FAQ: Can median crossovers be provided for emergency neighborhood access?



SITE P SR 2/SR 72/Woodlawn Ave – Florida T FAQs

FAQ: Will the hotel (under construction) result in significant traffic increases?



Hotel + restaurant:

Projecting +15 vehicles along NB Capitol Trail during PM peak with 4 of 15 expected to turn left onto E Cleveland Ave (net increase for 1,700 approach vehicles: 0.9%)

Fitted Curve Equation: Not Given

R² = ****

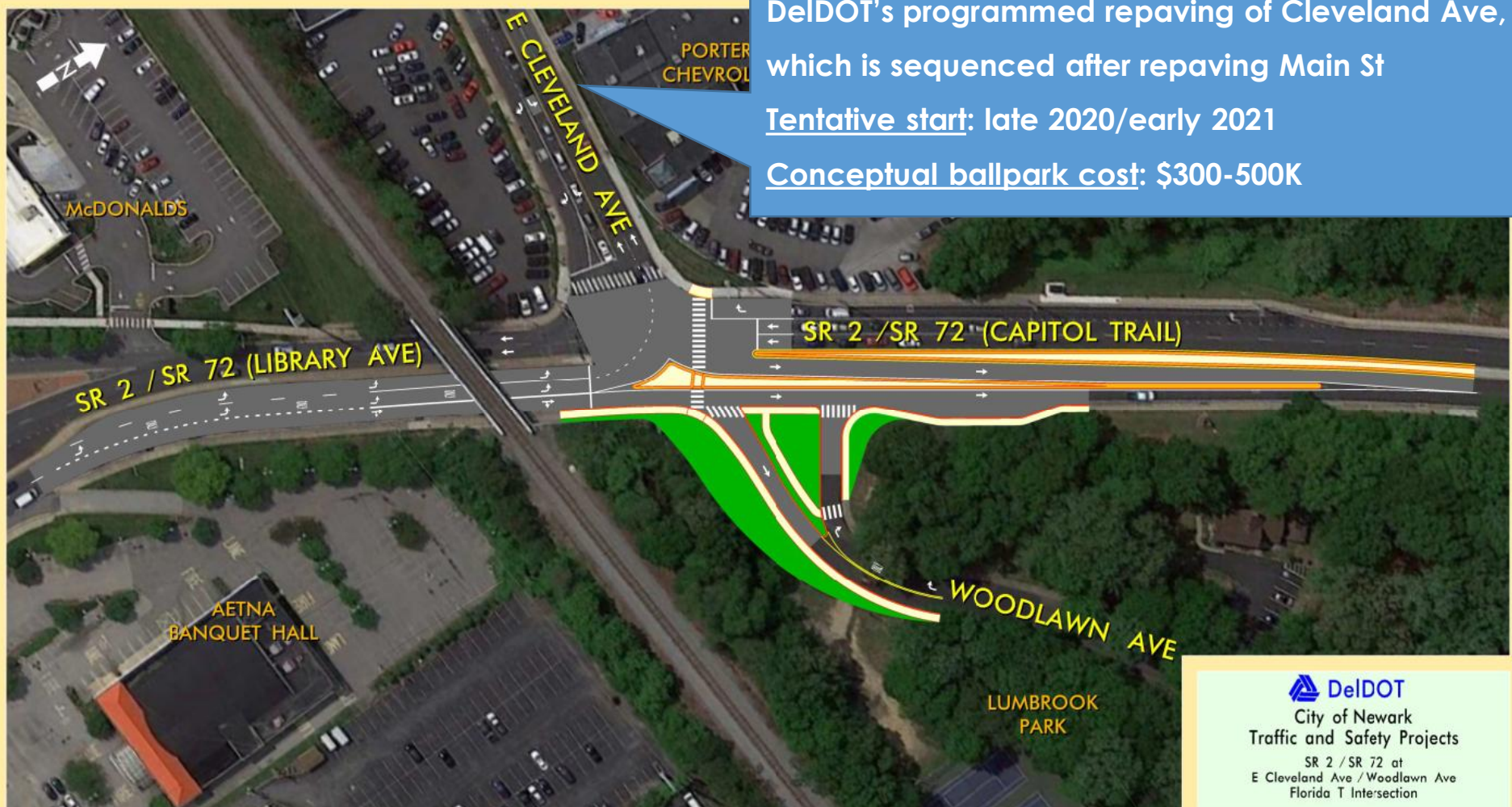
SITE P SR 2/SR 72/Woodlawn Ave – Florida T FAQs

FAQ: What is the anticipated project schedule and cost?

Florida T construction would be concurrent with DelDOT's programmed repaving of Cleveland Ave, which is sequenced after repaving Main St

Tentative start: late 2020/early 2021

Conceptual ballpark cost: \$300-500K



SITE P

SR 2/SR 72/Woodlawn Ave – Florida T Concept

Questions & open discussion

